POWER SECTOR SKILL COUNCIL

Proposed by Central Electricity Authority on behalf of

- **Ministry of Power**
- **Ministry of New and Renewable Energy**
- **Indian Electrical and Electronics Manufacturers' Association**

GlobalPeers Management Group
New Delhi

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INTRODUCTION TO PROPOSAL

This page introduces your Industry Sector, and the guiding philosophy behind this Proposal. Please fill in the following aspects (and any other that you wish), in a broad manner:

- Who are the promoters of this Proposal? What is the purpose?
- How is skill development being currently carried out in your Industry? What are the challenges?

Introduction

Promoters:

The Power Sector Skill Council (PSSC) is being promoted by **Central Electricity Authority (CEA) on behalf of Ministry of Power, Ministry of New and Renewable Energy (MNRE) & Indian Electrical and Electronics Manufacturers' Association (IEEMA)** and is supported by various PSUs, Associations, Organizations and Industry players in the power sector, renewable energy sector and power equipment manufacturing sector.

Central Electricity Authority

CEA is a Statutory Body constituted under the erstwhile Electricity (Supply) Act, 1948, hereinafter replaced by the Electricity Act 2003, where similar provisions exists, the office of the CEA is an "Attached Office" of the Ministry of Power. The CEA is responsible for the technical coordination and supervision of programmes and is also entrusted with a number of statutory functions. One of the many important responsibilities of CEA is to **promote measures for advancing the skills of persons engaged in electricity industry**, pursuant to which it is leading the effort to promote the Power Sector Skill Council.

Ministry of New and Renewable Energy (MNRE)

MNRE is the nodal Ministry of Govt. of India for all matters relating to New and renewable energy with the aim to supplement the energy requirements of the country. The main activities of MNRE are to facilitate R&D, manufacturing and deployment of new & renewable energy systems/devices, laying of standards, specifications, technology mapping and benchmarking, facilitate industry in obtaining appropriate international level quality assurance accreditation. The major non conventional sources of Renewable Energy are: Hydro-Energy (upto25 MW), Wind Energy, Solar Energy, biomass Energy, Tidal Energy, Geothermal Energy, Wave Energy, Biofuel Energy, Domestic & Industrial waste and Bagasse co-generation.

Indian Electrical and Electronics Manufacturers Associations (IEEMA):

IEEMA is the national representative organization of manufactures of electrical and electronics equipments. IEEMA represents about 800 members organizations from public, joint and private sectors with its members having distinctions of contributing to more than 95% of over 210000Mw installed generating capacity in India.

The major activities of IEEMA are dissemination of information about Govt. policy changes and statistics, representing view of the industry to Govt., formulating industry standards, operation and maintenance guidelines to meet specific needs of members and their users industries and conducting technical activities under their various divisions, organizing international conferences, workshops, training programs and quality awareness programs. IEEMA is part of many councils and committees constituted by the govt.

IEEMA as the representative of the industry maintains a dialogue with Govt., various utilities, other users, standardization bodies, educational, R & D and testing institutions. IEEMA is the certified body as per ISO 9001:2000. Sub-sectors of manufacturing sector are manufacturing of main equipments, ancillary and allied industry, repair and maintenance of equipment, household and commercial electrical industry

Purpose:

India is one of the fastest growing economies in the world with the Gross Domestic Product (GDP) growing for the last several years in spite of global recession. Development of adequate infrastructure is the most critical prerequisite for sustaining the growth momentum of the economy and ensuring inclusiveness of the growth process. In India, investment in infrastructure as a percentage of GDP has risen from 4.9% in 2002-03 to over 7.5% in 2010 and is expected to reach the target of 10% of GDP by 2016-17. With India's growing population, urbanization and focus on Infrastructure development, the present surge in electricity demand and the projected increase of the demand, the importance of available energy cannot be underestimated. The liberalization and globalization of the economy has resulted in increased pace in industrial and commercial activities and this combined with penetration of technology and I.T. in the day-today life is expected to result in a high demand and growth in Power. It is therefore essential that development of the Power Industry is commensurate with the overall economic growth of the country.

Currently the Power Industry is facing a major problem in getting skilled and employable manpower which is technically competent and ready to be deployed. The industry thrives with ad-hoc sourcing of manpower and ad hoc training techniques. As per CIDC (Construction Industry Development Council), it is estimated that only 3%-5% of the total blue collared workforce employed by the sector has some formal training or are certified. The skill gap is widening every year and impacting critical functions and quality of output. The shortage of skilled workforce may adversely impact the growth of this industry as the current sources of training are not scalable as per the required manpower. There is an urgent need to identify the gaps, asses the demand, build skilled workforce in millions for which all the Stakeholders need to work collectively to enlarge the pool of skilled workforce.

The purpose of establishing the Power Sector Skill Council (PSSC) is to ensure that skilled and certified manpower in adequate numbers is provided across various segments of this industry. The PSSC will create a dynamic Labour Market Information System (LMIS) to keep track of the labour market, will identify skill gaps, frame Occupational Standards in order to facilitate development of practical and high quality training content, ensure adequate availability of faculty through Train The Trainer initiatives, build accreditation and certification mechanisms and encourage capacity building through private sector participation. Though some of the job roles may be common to other Sectors like Construction and Capital Goods, there is need for specialization of skills required to handle Power Plants, Nuclear, Solar, Wind, Bio-gasses plants which carry a higher risk for human life especially the Nuclear Plants. The skill needs of the Power Sector can only be understood by the people who are associated with this Industry. The operation and maintenance of these plants with advanced technologies and high-end products need highly skilled workforce trained to use the latest tools and equipment. PSSC will utilize the information and data available with the other SSC for all the activities which are common to other related SSCs like the Construction and the Capital Goods SSCs.

Current status of Skill Development in the industry

Power Industry has unanimously been accepted as one of the vital sectors for economic growth of the Indian economy. There has been a rapid stride in the development of the power sector both in terms of enhancing power generation as well as in making power available to widely distributed geographical boundaries. In order to meet the increasing demand for electricity, there is a requirement of large additions to the installed generating capacity and development of associated transmission and distribution network. The key challenges to be addressed during the 12th Plan are providing access of power to all through sustainability, efficiency and effectiveness of Distribution. The per capita energy consumption in India is quite low at 879 kWH in 2011-12 as compared to the global average of 2300 units per person. According to the Electric Power Survey, the energy requirement of India is expected to increase multifold from 936589 MUs in 2011-12 to 37,10,083 MUs in 2031-32. The massive growth expected in the Power Sector and related Industries manufacturing Equipments for the Sector will require additional skilled manpower in the Industry. Following the technology upgradation, training and upskilling of the manpower currently employed will also be required as it is estimated that only 3%-5% of the total blue collared workforce employed by the sector has some formal training or are certified.

For the purpose of skill development the scope of the Power Sector Skill Council would cover the following Segments jointly referred as Power Industry:

1. Power Sector : Electricity Generation, Transmission, Power Systems Operations and Distribution
2. Renewable Energy Sector
3. Power Equipment Manufacturing Sector

Present Scenario of Training Facilities

Power industry is a multi-disciplinary, highly capital intensive industry where Human element is the most vital input. Power Industry requires technically trained manpower for various roles such as project planning, implementation, erection, commissioning, testing, O&M including transmission and distribution of power, Renewable Energy Sector and manufacturing segment. At present, no formal studies are available in educational institutions which can equip a person with knowledge of different inputs required for the job performance in Power Sector. Special training is necessary for personnel at every level in the industry to keep abreast with rapidly advancing state of the-art technology in the power industry. The Power Sector skill Council (PSSC) will be responsible for training/skill development of Workforce in the Power Sector, Renewable Energy Sector and Power Equipment Manufacturing Sector.

Skills Training for various Trades related to the Power Industry are being offered in both public and private institutions including ITIs (Industrial Training Institutes), ITCs (Industrial Training Centres) and VTIs (Vocational Training Institutes), however, they do not currently cater adequately to the skill demands of the industry and the curriculum offered does not provide training in essential job trades critical to the Industry. The current ITIs and other vocational training institutions provide courses for

basic skill sets only and lack provision of specialized skill required in the industry. The pace of change in technology is rapid hence very often the speed of obsolesce overtakes the rate of acquisition of particular skill and knowledge. All sectors are moving towards higher technology platforms hence the need for skilled talent will also increase proportionally which certainly cannot be catered to with the present number of ITIs/ITC/VTIs. Moreover, the skill sets required for the power sector in new areas is not available to meet the needs of the industry. Also, 69 ITIs have been adopted by PSUs/Private organizations.

As mentioned in the Report of The Working Group on Power for Twelfth Plan (2012-2017) issued by Ministry of Power, Govt. of India in January, 2012, although the technical knowledge acquired from engineering colleges, polytechnics, industrial training institutes and other technical institutions provides the basic foundation, the same needs to be supplemented with applied engineering skills in the various spheres i.e. power generation, transmission and distribution. The sector is facing challenges in sourcing skilled manpower and there is a shortage of experienced / skilled manpower as well as of RE trainers. As per the report of the Working Group on Power for 11th plan, the total manpower at the end of 11th Plan was estimated at 11.63 lakhs. Overall training load during 11th Plan was estimated at 4.65 lakh man-months/year. As per CEA data, it has been estimated that only 0.33 Lakh man-months/Yr training load was achieved by 68 institutes during 2008-09.

During the year 2010-11, the training infrastructure available has been estimated at 0.82 lakhs man-months/yr for about 70 training institutes. The Overall training load during 12th Plan is estimated as 2473.41 thousand man-weeks/year. The available training infrastructure is 1945.69 thousand man-weeks/year. Thus, there is a deficit of training infrastructure for 527.72 thousand man-weeks/year. The Training capacity of some of the Organizations based on the training imparted by them as quoted in the Report of The Working Group on Power for Twelfth Plan (2012-2017) issued by Ministry of Power, Govt. of India in January, 2012, are as given in the Table below

S. No.	**Name of the Organisation**	**Infrastructure available**	**Nos. Trained/Capacity**
1	National Power Training Institute (NPTI)	Nine Institutes in different zones Simulators: NPTI has 1 x 500 MW Thermal Training Simulator, 2 x 210 MW Thermal training Simulators, 1 x 430 MW (2 x 143 MW Gas Turbine and 1 x 144 MW Steam Turbine) Combined Cycle Gas Turbine Simulator, One each of Hydel and Load Dispatch Simulators.	1,80,000 in 4 decades
2	Power Management Institute (PMI) & other training institutes of NTPC	11 No of training institutes at its Project Sites	Training of 18,856 Man-Months per Year.
3.	NHPC	Institutes at Project Sites	1917 Man-Months per Year
4.	Neyveli Lignite Corporation	Institute at Neyveli	2407 Man-Months per Year
5.	TATA Power – DDL	Institute at Rohini, New Delhi	10000+ training mandays in last 5

			yrs
6	Hot Line Training Centre (HLTC)	Institute at Bangalore	Trained 3000 personnel since inception in 1958

i) Training facilities in Power Sector - Electricity Generation, Transmission & Distribution

The National training policy (NTP 2002)

This is the key policy intervention to include the training practices in the power sector. This policy mandates that "every organization in the power sector should have written training policy document, containing strategies to ensure training for all for a minimum period of 1 week annually for each employee". This policy requires organizations to allocate adequate funds for training and development activities for meeting the stipulated training requirement.

Central Electricity Authority

This is a statutory body constituted under the Electricity Act. One of the important functions of CEA is to promote measures for advancing the skill of person engaged in electricity industry. CEA has already setup the standards for mandatory training required for various skill sets for the generation, transmission, distribution etc. CEA has recognized 74 training institutes (Ref. Annexure II) throughout the country under the Govt. and Pvt. Sector for providing such training at various levels.

Basically three types of training infrastructures/facilities are available for personnel in the Power Industry:

1. Training institutes recognized by CEA for imparting statutory induction training: There are Seventy Four Training Institutes recognized by CEA under various Power Utilities. These institutes mostly cater to the induction training needs of thermal power stations.
2. Lineman Training Institutes: A good number of the SEBs have at least one lineman-training center. But they are quite inadequate vis-à-vis the enormous need. Also the quality of these centers is often far from satisfactory.
3. Other Training facility (Class/board rooms for refresher/ management programs) including networking with academic/training institutions outside power sector : National Power Training Institute has established a Centre for Advanced Management & Power Studies (CAMPS) at its Faridabad campus. In addition to a number of short-term courses on Technology-Management interface, it also conducts a two-year full time MBA Program in Power Management. NPTI also conducts professional courses, integrating power-training experience with academics, like PDC & PGDC in Power Plant Engineering and B.E./B.Tech. in Power Engineering etc. Central Board of Irrigation & Power also conducts power industry interfaced placement oriented long term training programmes in themal, transmission and distribution besides high end short term programmes in advance technologies in all disciplines of power sector.

The 74 institutes recognized by CEA, except those belonging to NPTI and CBIP, have been set up by the respective organizations for imparting training to their own employees. The training imparted by them is limited to the specific requirement of their organization/project and even if they have some spare capacity during any period of the year, they are not able to utilize it for others because hostel facilities for outsiders is either not available or is available in a limited way. NPTI trained approx. 15,800 people in 2010-11 and has trained approx. 180000 people in the last 4 decades; CBIP has trained approx. 10,000 senior engineers in 4 years; other Institutions have a limited capacity.

The Central Electricity Authority states the provisions of mandatory training (measures relating to safety and electricity supply) Regulations 2010. The regulations 6 & 7 of the said CEA Regulations 2010 are reproduced as under:

Quote-

Regulation 6- Safety measures for operation and maintenance of electric plants:

1) Engineers and supervisors appointed to operate or undertake maintenance of any part of whole of thermal power generating station and a hydro power plant together with associated sub-station shall hold diploma in Engineering from a recognized institute, or a degree in Engineering from a university.
2) The technicians to assist engineers or supervisors shall possess a certificate in appropriate trade, preferably with a two years course from Industrial Training Institute recognized by the Central Government or the State Government.
3) Engineers, supervisors and technicians engaged for operation and maintenance of electric plants should have successfully undergone the type of training as specified in the **Schedule-I**.

    i. Provided that the existing employees shall have to undergo the training mentioned in sub-regulation (3) within three years from the date of coming into force of these regulations.

4) The owner of every thermal power generating station and hydro power plant together with their associated sub-station shall arrange for training of personnel engaged in the operation and maintenance of his generating station alongwith associated sub-station in his own institute or any other institute recognized by the Central Government or the State Government.

    Provided that separate training shall be given to the persons engaged in operation and maintenance of thermal power stations and hydro power stations including associated sub-stations.

Regulation 7- Safety measures for operation and maintenance of transmission and distributions systems:

1) Engineers and supervisors engaged in operation and maintenance of transmission and distribution systems shall hold diploma in electrical, mechanical, electronics and instrumentation engineering from a recognized institute or university.
2) The technicians to assist engineers or supervisors shall possess a certificate in appropriate trade, preferably with a two years course from Industrial Training Institute recognized by the Central Government or the State Government.
3) Engineers, supervisors and technicians engaged for operation and maintenance of transmission and distribution systems should have successfully undergone the type of training as specified in the **Schedule-II.**

   Provided that the existing employees shall have to undergo the training mentioned in sub-regulation (3) within three years from the date of coming into force of these regulations.
4) The owner of every transmission or distribution system shall arrange for training of personnel engaged in the operation and maintenance of transmission and distribution system in his own institute or any other institute recognized by the Central Government or the State Government.

-Unquote

For implementing the above regulations effectively and on rational basis, CEA has framed guidelines and norms to prescribe the procedure to be followed by CEA/MoP for recognition and grading of the training institutes for power sector in the country.

Presently, following types of training are provided to the workforce in power segment for Electricity Generation, Transmission and Distribution personnel:

- Operation & Maintenance Training to all existing employees engaged in O&M of generating projects and transmission & distribution system ranging from 4 Weeks to 30 Weeks. This includes the classroom training, Simulator training for Thermal & Hydro and On-Job training.
- Induction level training for new recruits for 1 month (Technical & Non-Technical).
- Refresher/Advanced training of 5 Days in a year to all existing personnel of varying degrees in various specializations in line with National Training Policy for Power Sector.
- Management training of 5 Days in a year to the senior Executives/Managers in India/Abroad in line with National Training Policy for Power Sector.
- Distance Learning Certificate Programs on Power Distribution Management for JEs/ AEs.
- Certificate of Competency in Power Distribution (CCPD).
- Training under Distribution Reforms, Upgrades and Management (DRUM).
- C&D* Employees Training.
- Franchisee Training.
- Training under R-APDRP etc.
- Linemen training at linemen training centres**.**

*****(non-executives in secretarial staff, accounts wing, technical staff in nonexecutives and Class-IV are categorized as C&D employees)

Training at other Centres (the list is indicative and not exhaustive):

I. MDI Gurgaon: The Centre for Energy Management promotes research training and organizational work for effective management of energy and power systems and provide opportunities to managers of energy and power systems for developing managerial skills and techniques. The centre coordinates the courses for NMP and PGP in the area of energy management. Presently the course on 'Management of Energy and Environment' has been introduced as a core course for the NMP.

II. Power Finance Corporation provides training to State Power Utilities on Financial management and policies, Project Management, Transmission and Distributuon loss reduction Implementing high voltage distribution system

III. Apart from the Universities and other Technical Education Institutions and Ministry's specialized technical institutions, reputed training institutes such as Indian Institutes of Management; Indian Institute of Public Administration, New Delhi; National Institute of Rural Development, Hyderabad; Administrative Staff College of India, Hyderabad; National Institute of Advanced Studies, Bangalore; IISc, Bangalore; Indian Institutes of Technology; National Power Training Institute, Faridabad; Banking Staff Training Institute, Pune; Public Sector Undertakings/organizations; Autonomous Organizations under Central/ State Governments; NGOs such as Social Work Research Institute, Tilonia, The Energy & Research Institute, New Delhi, World Institute for Sustainable Energy, Pune, Development Alternative, New Delhi etc and premier institutes working on different aspects of renewable energy abroad, will be associated for imparting training to the professionals and conducting other HRD activities. Many power sector organizations (e.g. : NTPC, NHPC, Power Grid etc) have developed regular tie up with institutions like IITs, IIMs, MDI etc. for providing necessary knowledge and skill inputs to their personnel.

IV. MBA course in Power Management is offered in almost all B schools viz.

1. Indian Institute of Management, Ahmedabad (IIM A)
2. Indian Institute of Management, Calcutta (IIM C)
3. Indian Institute of Management, Bangalore (IIM B)
4. Indian Institute of Management, Lucknow (IIM L)
5. XLRI – Xavier Labour Research Institute, Jamshedpur
6. ISB – Indian School of Business, Hyderabad
7. FMS – Faculty of Management Studies, University of Delhi
8. Indian Institute of Management, Indore (IIM I)
9. Indian Institute of Management, Calicut (IIM K – Kozhikode)
10. Jamnalal Bajaj Institute of Management Studies, Mumbai (JBIMS)
11. S. P. Jain Institute of Management Studies, Mumbai (SPJIMR)
12. Shailesh J. Mehta School of Management, IIT Mumbai (Bombay)
13. Management Development Institute, Gurgaon (MDI)

14. Narsee Monjee Institute of Management Studies, Mumbai (NMIMS)
15. Xavier Institute of Management, Bhubaneswar (XIM B)
16. Symbiosis Institute of Business Management, Pune (SIBM)
17. Symbiosis Center for Management & Human Resources Development, Pune
18. Institute of Management & Technology, Ghaziabad (IMT)
19. International Management Institute, Delhi (IMI)
20. Bharathidasan Institute of Management, Trichy (BIM)
21. Mudra Institute of Communications, Ahmedabad (MICA)
22. Indian Institute of Foreign Trade, Delhi (IIFT)
23. T. A. Pai Management Institute, Manipal (TAPMI)
24. Loyola Institute of Business Administration, Chennai (LIBA)
25. Institute of Management Development Research, Pune (IMDR)

ii) Training facilities in Renewable Energy Sector

In the Renewable Energy Sector, there is a sizeable number of manpower involved, both in organized as well as unorganized sector, in manufacturing of equipment, their installation, operation, maintenance, transmission and distribution of energy generated from renewable energy sources. Facilities for imparting training in various trades are available with some major manufacturers. This sector is spread widely in urban as well as rural areas where large number of manpower is engaged in small units which have limited or no training facilities. The sector is facing challenges in sourcing skilled manpower and there is a shortage of experienced / skilled manpower as well as of RE trainers.

Some examples of training courses for Renewable Energy are (indicative list, not exhaustive):

I. The State Renewable Energy Agencies are being supported to organise short-term training programmes for installation, operation and maintenance and repair of renewable energy systems in such places where intensive RE programme are being implemented. Renewable Energy Chairs have been established in IIT Roorkee and IIT Kharagpur

II. The National Centre for Photovoltaic Research and Education (NCPRE) based in IIT Bombay holds classes for industrialists, academia and engineering students on Renewable Energy.

III. Amity University have started courses in renewable energy.

IV. Energy Alternatives India (EAI) Training Division provides conceptual and hands-on training across all renewable energy sectors. Viz Knowledge Series on Solar, Wind, Biomass Power and Energy Efficiency Renewable Energy Training for Engineering Students , Renewable Energy Training for Corporate Professionals

V. The Centre for Energy at Indian Institute of Technology Guwahati imparts teaching, conducts research and to provide consultancy in various facets of energy technology and systems. The centre will give priority to activities in the field of bio-energy, small hydro-power, solar photovoltaic and solar thermal power.

iii) Training facilities in Power Equipment Manufacturing Sector

Large number of manpower is involved in manufacturing of power equipments, ancillary units and providing repair, maintenance and allied services, both in organized as well as unorganized sector. Facilities for training of the organized segment of the manpower in these areas are available with many major manufacturers and some of them have also adopted ITIs for imparting training in various trades. There are also certain independent training centres whose facilities are being utilized by various manufacturers but training facilities for unorganized manpower are lacking in this sector as well. Some of the large manufacturers of electrical equipment have set up their own skill development centres and are able to train the skilled manpower as per their own requirement. However, 90% of the T&D equipment manufacturers are in the SME sector and are widely scattered all over the country who are not able to focus on skill development.

Challenges faced by the Industry in Skill Development

Following challenges emerge when we examine factors leading to the shortage of skilled manpower and skill gaps in the Power Industry:

- The technology is changing very fast and requires regular updation of knowledge and skills for the employees currently employed.
- Besides deficit of skilled manpower in organized sector, there is a major requirement of training inputs in the unorganized sector. The major challenge in skill development is in the unorganized sector where large number of workforce is illiterate or semi literate, unskilled or semi skilled; keep shifting jobs and locations
- The majority of the engineering graduates passing out from the reputed institutes join the IT/Management sector. The quality of students available from engineering, diploma and industrial training institutes need extensive training before their deployment in the Power and related sectors.
- There is a need for adopting modern and scientific training methodologies and creating an infrastructure including course materials and training aids.
- There is lack of proper communication between Training Providers, trainees, employers, Planning and Policy makers with the result that the training facilities are under-utilized, trainees are not getting placements and employers are not getting trained manpower.
- There is no appropriate testing and accreditation system hence employers find it difficult to rely on the documents produced by trainees coming up for employment.
- At present, there is no formal mechanism to identify the quantum of manpower required for different trades or type of skilled manpower required in various segments
- There is lack of applied engineering knowledge in the freshly recruited manpower for which practical training in the labs, industries and simulator is required.
- Lack of networking of educational institutes with the industries leads to non-availability of access to the man-power to be trained for practical training.

PROJECT OBJECTIVE

What do you expect to achieve by this Project? Use this page to describe your objectives.

The PSSC will be responsible for meeting the human resource requirement of the entire value chain of the Power Industry. To ensure that the human resource pool size as well as quality meets the growing & evolving demands of the Industry, the following tasks will be required:

1. **Collate and disseminate labour market information** with respect to number of people getting direct and indirect employment in various areas of the industry.
2. **Research and aggregate skill requirements of the Industry** including sub-sector requirements, regional requirements and international trends and best practices that can be introduced in the domestic skill development space.
3. **Create skill database** of the current and future skill requirements, both in terms of numbers as well as types of skills and investigating the underlying reasons for skill gaps.
4. **Identify changing technologies in the sector and collate technology specific skills** which may be required in future. Besides technical skills, list out soft skill requirement in terms of content, the depth of coverage required and practical training requirement etc. and lead the drive to boost skill development to improve productivity, growth & employment
5. **Regulate the skill development activities** in the Industry including development of National Occupational Standards and qualifications. It will collaborate with the industry to map typical job profiles, develop the occupational and competency standards for each of the job profiles / roles in the industry, and the career path for all role holders.
6. **Build Capacity for training delivery:** Directly influence the planning & funding of education & training across India, working within the distinctive arrangements in each nation. Help in developing training curriculum and assessment criteria, identify institutes who would partner for training and train the trainers
7. **Provide quality assurance via accreditation & certification** of training delivery bodies and awarding certification to trainees. Accreditation will include approving the course content, infrastructure requirements, certification of faculty etc. Certification criteria will be developed in conjunction with the Government bodies/Agencies.
8. **Develop Centre of Excellence (COE)** to serve as Technology Demonstrator for Training, skill development and as benchmark for other training institutes to be set-up thereafter. Several Training centres with latest simulation equipment will need to be established to provide practical training of different types suiting to the organizational/trainee's needs e.g. compact simulator, generic simulator or full-scope/replica simulator etc. COEs would focus on Training, Awareness, Accreditation and other advisory services.

The SSC will thus function as the apex body on skill development for the industry sector as well as coordinate the efforts of various agencies in the area of skill development.

BACKGROUND INFORMATION

This part will provide the context for this Proposal. Key aspects which can be covered in this part (one or two Paras on each) are:

- Description of the Industry Sector - what are its sub sectors (e.g., for Retail, does it include the supply chain?), its historical perspective, growth rate etc.
- Key or core activities in the Industry
- Demand Supply Analysis of various sub sectors of your Industry (use tables where possible)
- Employment creation across the value chain (e.g., for auto companies, those in manufacturing, selling, drivers, supply chain etc)
- Requirement of manpower across various experience levels/grades
- Availability of manpower. Analyse through the lens of quality and quantity.
- Functional distribution of Human Resources - here give the % of resources in each function of your Industry Sector , in a Tabular Form - e.g., what % are involved in manufacturing, sales, supply chain and others.
- Regional distribution of manpower requirement - district/cluster/city/state wise % of requirement- depends on your industry pattern.
- Skill gaps in the Industry Sector - the major skill gaps for each type of job/profession can be listed here - as per format of skill gap analysis done by NSDC (www.nsdcindia.org).
- Please give reference for your data.
- Reasons for skill gaps. Here analyse the probable causes of skill gaps listed above. Are they due to inadequate industry- training provider interaction, or poor trainers, or outdated content, or all of these? Please be as specific as possible.
- Participation, efficacy of training by Govt bodies and institutions in your Industry Sector.
- Size of unorganized Industry in your Sector, by manpower numbers.

Your response should not exceed five pages, including this page. Please make optimal use of graphs, charts and numbers

India is targeting a gross domestic product (GDP) growth rate of 8-9% in the coming years. To enable this growth, the country's economy needs the support of its power industry to cater to India's increasing power demand. Globally, India is presently positioned as the eleventh largest manufacturer of energy, representing roughly 2.4% of the overall energy output per annum. The Indian power Industry is one of the most diversified in the world. Sources for power generation range from commercial sources like coal, lignite, natural gas, oil, hydro and nuclear power to other viable non-conventional sources like wind, solar and agriculture and domestic waste. The Power industry is particularly influenced by spending on infrastructure investment and urbanization. With planned investments in infrastructure of more than > US$1 trillion in the XIIth Five year plan, the demand for electricity is expected to grow at a rapid rate in the years to come. In order to meet the increasing requirement of electricity, massive addition to the installed generating capacity in the country is required.

The Industry today is faced with the challenge of unavailability of enough skilled people to fulfill its manifold requirements. From electricians to masons or from bar benders to welders, not to mention architects, supervisors, foremen, and engineers, there is currently a severe shortage of skills across the board to meet the needs of India's electricity generation, transmission and distribution - something that has affected the Govt. of India being unable to realize its Mission 2012 goal of 'Power for All'. The

'people' challenge confronting the power industry is only going to increase further as it tries to keep pace with India's rising energy demand fuelled by a growing economy year-on-year. Hence all out collective efforts are required to tackle pain points in the form of inadequate training facilities, course curricula at educational institutions not being in sync with industry requirements and attracting the limited talent available.

The Power Industry can be divided into three Broad Segments:

1. Power Sector: Electricity Generation, Transmission, Power System Operation and Distribution
2. Renewable Energy Sector
3. Power Equipment Manufacturing sector

i) Power Sector : Electricity Generation, Transmission and Distribution

Key/Core Activities in the Power Segment for Electricity Generation, Transmission and Distribution are:

- Power Generation
- Power Transmission
- Power System Operation
- Power Distribution
- Trading
- Regulation
- Research & Development
- Financing
- Training
- Construction

Ministry of Power, Govt. of India is vested with administrative powers for perspective planning, policy formulation, processing of projects for investment decision, monitoring of implementation of power projects, training and manpower development and administration and enactment of legalization in regard to generation, transmission and distribution. Ministry of Power is assisted by Central Electricity Authority (CEA) for all technical matters. CEA is a statutory body constituted under the Electricity Act.

Historical Perspective

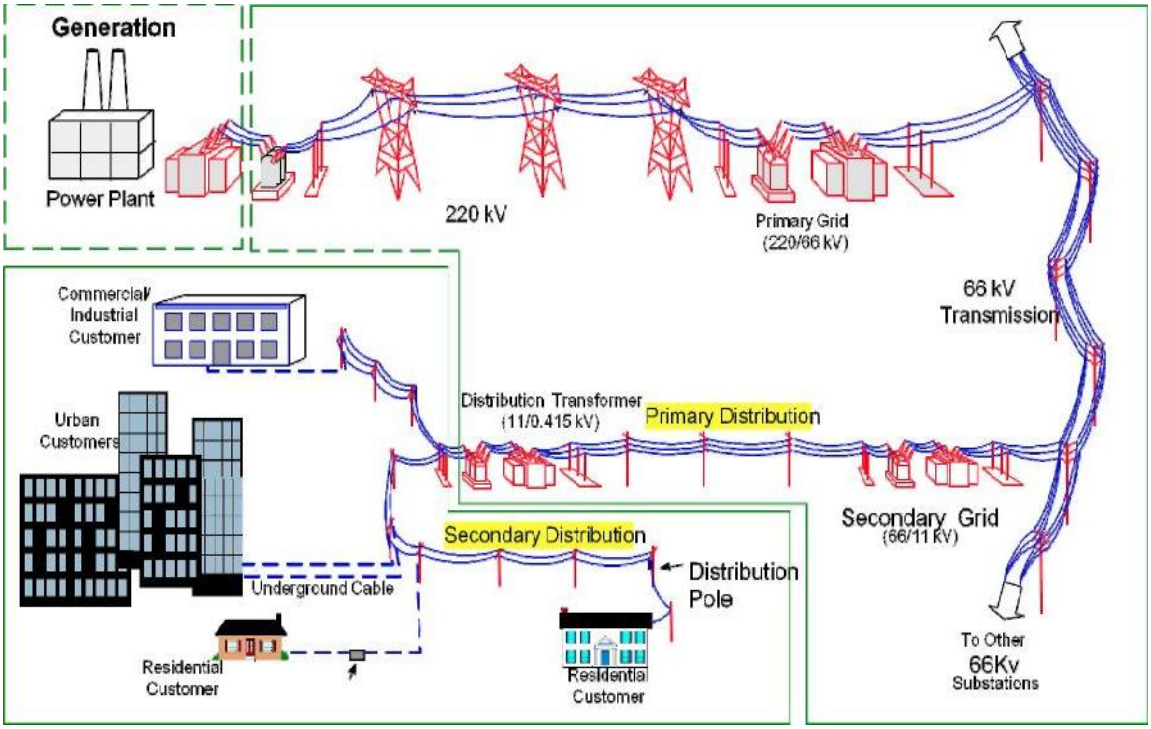
- Prior to independence electricity generation, transmission & distribution was in private hands; with the enactment of Electricity Act 1948, electricity generation, transmission & distribution was nationalized.
- In the year 1975 central generating companies i.e. NTPC, NHPC, NEEPCO etc were created and in 1989 Powergrid Corporation Ltd. was established for power transmission.
- In 1991, power sector was opened to the private sector and in 2003, Electricity Act 2003 was enacted providing for reforms, restructuring, trading as a separate activity and setting up of Regulatory Commissions at the state and central level.

- The installed capacity which was 2194 MW at the time of independence has now grown upto 211766 MW.
- The transmission network which was 3708 ckt. km at the time of independence has now grown to 268280 ckt. Km. and is likely to further grow upto 364921 ckm. at the end of 12Plan and 494921 ckm. at the end of 13th Plan (220Kv and above).
- There are 35 cities, 4378 towns and 640 districts in the country having large number of consumers.
- Out of 593732 nos. of villages 558857 have been electrified compared to 1500 villages at the time of independence.
- 18658721 pump sets have been energized for irrigation compared to 6430 at the time of independence.
- Cumulative aggregate growth rate as assessed by CEA for peak load projections in the 18th EPS for the period 2009-10 to 2016-17 and 2016-17 to 2021-22 is 9.58% and 7.27% respectively.
- It is proposed to add 88537MW of installed capacity during the 12th Plan and 86,400 MW during 13th Plan.

Captive Generation

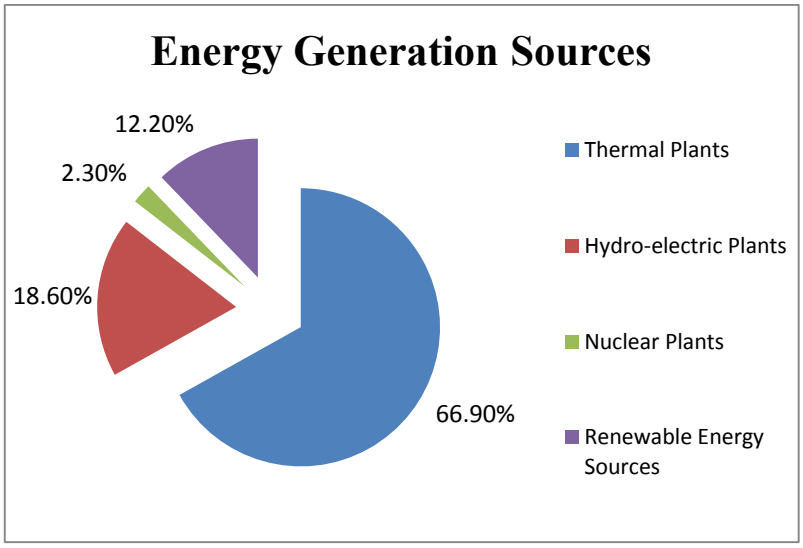
- The grid interactive captive generation capacity (1 MW & above) is about 36511 MW.
- A capacity addition of about 13,000 MW is likely during 12th Plan (April 2012 to March 2017)

The sub-sectors of the power sector are generation, transmission and distribution (ref Figure below)

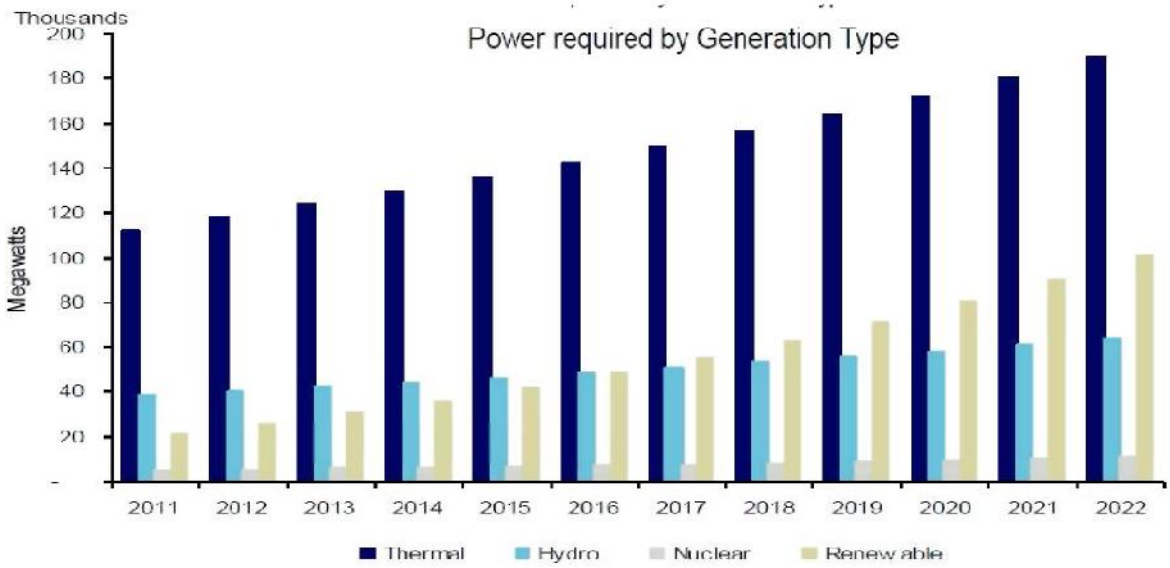


Sources of Power Generation:

India's energy-mix comprises both non-renewable (coal, lignite, petroleum and natural gas) and renewable energy sources (wind, solar, small hydro, biomass, cogeneration bagasse etc.). As per Central Electricity Authority, about 66.9% of the electricity in India is generated by thermal power plants, 18.6% by hydroelectric power plants, 2.3% by nuclear power plants and 12.2% by Renewable Energy Sources. Further, more than 50% of India's commercial energy demand is met through the country's significant coal reserves. The country has also invested heavily in recent years in renewable energy utilization, especially wind energy.



- At present the installed capacity is about 41% in the State Sector, 30% in the Central Sector and 29% in the Private Sector
- The share of private sector in Generation capacity is increasing
- The projected Generation of power through various sources are as given below:



Source: Central Electricity Authority, IBEF, Aon Hewitt Analysis

The roles played by various organizations in the Power Sector are as below:

Activity	Responsibility
Generation	Central Generating Stations (e.g. NTPC, NHPC)
	Joint Ventures – Centre & State (NEEPCO, THDC, DVC)
	State Generating Stations (e.g. APGENCO, Mahagenco)
	Independent Private Producers (e.g. Reliance Power, Tata Power and Adani Power etc)
Transmission	Central Transmission Utility (PGCIL)
	State Transmission Utilities (e.g. APTransco, KPTCL)
	Private entities (e.g Reliance, Tata)
System Operators	National Load Despatch Centre
	Five Regional Load Despatch Centres
	State Load Despatch Centres
Distribution	Distribution arm of State Electricity Boards (e.g. TNEB, PSEB etc.)
	Distribution Companies (e.g. Reliance, Tata, Bescom, etc.)
	Private Companies (e.g. Reliance Infra, NDPL, CESC, etc.)
	Franchises (e.g. Torrent)

The Key Players in these three subsectors are:

Power Sector

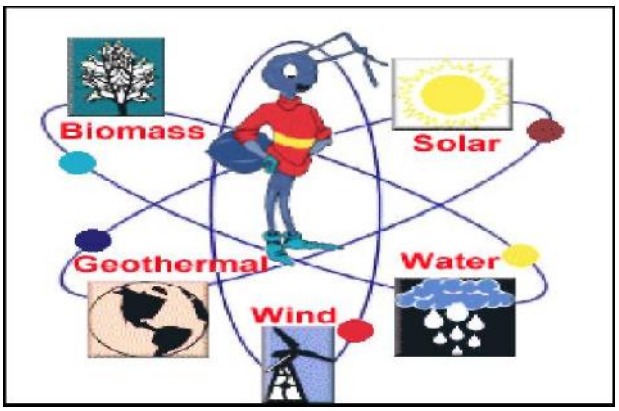
Central Sector: NTPC, NHPC, DVC, Power Finance Corporation, Neyveli Lignite Corporation Limited, Nuclear Power Corporation of India Limited, SJVNL, REC, NEEPCO, PFC, BBMB.
State Sector: Generation, Transmission and Distribution Companies and Electricity Boards/ Departments.
Private and other Companies in Power Sector: Reliance Power, TATA Power, Jindal Power, Torrent Power, JP Power, GVK Power, GMR, Lanco, Essar Power, Adani Power.

ii) Renewable Energy Sector

Key/Core Activities in the Renewable Energy sector are:

- Power generation from wind, solar, biomass & biogases generation, small hydro (upto 25MW), domestic & industrial waste, tidal & geothermal.
- Heat generation
- Solar lighting
- Renewable energy for Cooking

India is the only country in the world which has a dedicated Ministry for New & Renewable Energy (MNRE), which facilitate R&D, manufacture and deployment of new & renewable energy system/devices, laying of standards, specifications, technology mapping and benchmarking, facilitate industry in obtaining appropriate international level quality assurance accreditation. The major non conventional sources of Renewable Energy are: Hydro-Energy (upto25 MW), Wind Energy, Solar Energy, biomass Energy, Tidal Energy, Geothermal Energy, Wave Energy, Biofuel Energy, domestic & industrial waste and Bagasse Co-generation.



The installed renewable power capacity in India is about 27500 MW, though it has an estimated potential of about 85000 MW excluding solar power. India is a leader in wind, biomass and solar PV sectors and ranks among the top ten countries of the world in renewable energy. It is planned to add 30,000MW of installed capacity during the 12th Plan and 30,500MW during the 13th Plan from renewable energy sources.

Potential and actual achievement in respect of renewable energy sources:

Grid Interactive Power	Potential (MW)	Achievements (MW)
Sector		
Wind	45195	18420.40
Small Hydro (upto 25MW)	15000	3496.14
Bagasse Cogeneration	5000	2239.63
Biomass	16881	1248.60
Waste to Power	2700	96.08
Solar Power (SPV)	-----	1176.25
Total	84776	26368.36
Off Grid / Captive Power		803.306

Key players in the renewable or green energy sector

Signet Solar, Tata BP, L&T, Moser Baer, Suzlon, Jyoti

iii) Power Equipment Manufacturing Sector

Key/Core Activities in the Power Equipment Manufacturing sector are:

- Manufacturing Industry
- Ancillary Industry.
- Allied Industry like Repair & Maintenance and sale etc.

Rapid development of a robust and healthy domestic electrical Equipment (EE) industry, supporting the complete value chain in power generation, transmission and distribution is crucial for the economy. The Indian EE industry, which comprises around 90% SMEs, has grown close to Rs. 110,000 Cr (US$ 25bn) in 2010-11. The industry had a growth rate of 13.7 per cent in 2010-11 and registered a moderate 7% growth in the last financial year, 2011-2012. India's electrical equipment industry is highly diverse and manufactures a wide range of high and low technology products in varied price and quality ranges. The activities carried out by this sector are manufacturing of main equipment, ancillary Industry & allied industry which comprises of repair & maintenance of equipment, household & commercial electrical industry.

The industry can be broadly classified into two sectors – Generation equipment and T&D equipment. Generation equipment segment consists of boilers, turbines and generators while the T&D equipment segment consists of Transformers, Switchgear, Capacitor, Cables, Transmission Lines, Instrument Transformers, Surge Arrestors, Insulators, Energy Meters etc. Other Electrical Equipment includes Rotating Machines, , Stamping & Lamination, Insulating Material, Industrial Electronics, Indicating Instruments, Winding Wires, etc. For 2011-12, the industry size is estimated at Rs. 1.20 lakh crores, of which generation equipment segment consisting of BTG contributed Rs. 31,000 crores while the major T&D equipment segment of transformers, cables, transmission lines, switchgears, capacitors, energy meters, etc., provided the larger share of Rs. 64,235 crores. Other electrical equipment, including instrument transformers, surge arrestors, stamping and lamination, insulators, insulating material, industrial electronics, indicating instruments, winding wires, etc., contributed to Rs. 25,000 crores. With this huge demand for electricity in the country, the sector can only grow in the future. The domestic electrical equipment sector is very heterogeneous and manufactures a varied range of products with more than 90% companies being SMEs which contributes 40% to 50% of the total production.

Key Players:

BHEL, Alstom, L&T, ABB, Siemens, Crompton Greaves, Cable Corporation, KEC, Finolex, Havells, Bajaj Electricals, Schneider, etc.

Human Resource and Skill Requirements in the Power Industry

Manpower requirement in 12th Plan and 13th Plan

Infrastructure Power or electricity is one of the most critical components of infrastructure affecting economic growth and well being of nations. Availability of reliable and inexpensive power is critical for its sustainable economic development. The projected growth of this industry requires additional skilled manpower in the entire value chain. The projected incremental requirement of workforce is given in the following paras.

i) Power Sector

As per National Electricity Plan for a capacity addition of 88,537 MW in the 12th Plan, the manpower requirement for the power sector shall be of the order of 11.09 lakhs out of which 4.54 lakhs will be additional manpower for operation and maintenance and 6.55 lakhs in construction of generation, transmission & distribution works. For a capacity addition of 86,400 MW in the 13th Plan, the manpower requirement for the power sector shall be of the order of 11.50 lakhs out of which 4.05 lakhs will be additional manpower for operation and maintenance and 7.85 lakhs in construction of generation, transmission & distribution works. The personnel engaged in construction area in the Power sector during 11th Plan would be adequate to meet the requirement in construction during the 12th Plan and there will be some additional manpower required for construction works during the13th plan. The construction manpower by the end of 12th Plan has been assessed to be 6.55 lakhs and the same manpower with marginal change would continue to work in 13th Plan.

Manpower Projection for 12th Plan

(In Lakhs)

S.No	Area	Capacity Addition (MW)	Manpower at the end of 11th Plan		Manpower Requirement for 12th Plan			Manpower at the end of 12th Plan
			O&M	Const	O&M	Const	Total	
1	Thermal	72,340			0.725			
2	Hydro	10,897			0.185			
3	Nuclear	5,300			0.085			
Power System								
4	Transmission							
5	Distribution				3.54			
Total	**88537**		**11.20**		**4.54**	**6.55**	**11.09**	**14.34***

*Assumptions: Retirement-20% and Recoupment-7.5%;

Manpower Projection for 13th Plan

(In Lakhs)

S.No	Area	Capacity Addition (MW)	Manpower at the end of 12th Plan		Manpower Requirement for 13th Plan			Manpower at the end of 13th Plan
			O & M	Const	O & M	Const	Total	
1	Thermal	56,400			0.51			
2	Hydro	12.000			0.18			
3	Nuclear	18.000			0.25			
Power System								
4	Transmission							
5	Distribution				3.11			
Total	**86400**		**14.34**		**4.05**	**7.85**	**11.90**	**16.60***

*Assumptions: Retirement-20% and Recoupment-7.5%

ii) ***Renewable Energy Sector***

As per the study conducted by Confederation of Indian Industry (CII) along with Ministry for New & Renewable Energy to estimate the future Human Resources needs in Indian Renewable Energy Sector, the projected employment for the years 2017 and 2022 with projected growth rate is tabulated below. The functional areas of these existing jobs include – manufacturing, fabrication, installation, operations & maintenance, project development and marketing.

Estimated Current and Future Employment of RE Sector in India

Sector	Estimated Current Employment	Projected Growth Per annum %	Estimated Projected employment (in No.)	
			2017	2022
Wind	42,000	15	80,000	160,000
Solar PV on-Grid	40,000	50	39,000*	152,000**
Solar PV off-Grid	72,000	50	140,000*	225,000**
Solar Thermal	41,000	17	123,000*	270,000**
Biomass on-Grid	35,000	10	62,000	100,000
Biomass Gasifier	22,500	10	39,000	63,000
Biogas	85,000	20	196,000	395,000
Small Hydro	12,500	10	20,000	30,000
Total	**350,000**		**699,000**	**13,95,000**

* Employment for 2017 estimate based on JNNSM targets **
Employment for 2022 estimate based on JNNSM targets

Note: Employment figures estimated for 2015 and 2020 as shown in the study carried out by CII are assumed to be the same for the years 2017 & 2022 i.e. by the end of 12th & 13th Plan

iii) Manufacturing Sector

The prime customers / buyers of the electrical equipment industry are the power utilities, owned mostly by the Central Government or different State Governments. The demand for electrical equipment in India is expected to grow significantly against the backdrop of growth in the power sector. During the Twelfth Five Year Plan, investments are expected to be worth around US$ 85 bn in generation, US$ 45 bn in transmission and US$ 70 bn in distribution. Based on investment estimates and capacity-addition targets, it is estimated that the size of the domestic market in generation equipment is expected to reach US$ 25-30 bn by 2022 (from US$ 5.7 bn in 2011), while that of the T&D equipment industry is estimated to grow to US$ 70-75 bn (from US$ 18.5 bn in 2011). This translates into a CAGR of around 14%. While some of the Manufacturers of Equipments in the Organised Sector have been able to fulfill the requirement of skilled manpower by training people in their own facilities, getting skilled Operators and Maintenance Personnel is a challenge because Manufacturers in unorganized sector are not able to focus on any formal training.

The manpower requirement in the manufacturing and allied industry is expected to be of the order of around 70 lakhs by the end of 13th Plan i.e. by the year 2022 as detailed below:

Sector	Existing	By the year 2022
Manufacturing Industry	5 Lakhs	15 Lakhs
Ancillary Industry	10 Lakhs	20 Lakhs
Allied Industries like Repair & Maintenance,	15 Lakhs	35 Lakhs*
Total	30 Lakhs	70 Lakhs

*Note: The manpower requirement for allied industries like repair & maintenance, sale etc has been assumed as sum of manpower requirement for manufacturing industry and ancillary industry

Incremental Manpower Requirement for the Power Industry by the end of 13th Plan

Total Manpower Projection by the year 2022 (in Lakhs)

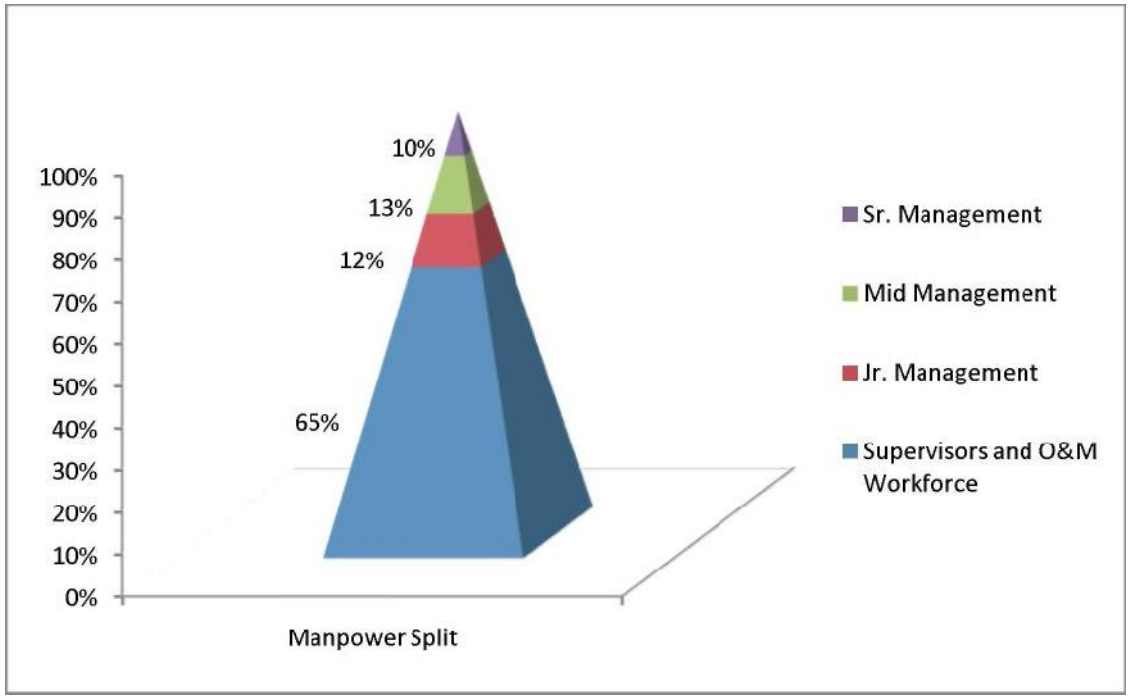
S.No	Sector	Current	Manpower Requirement in 2022	Incremental Requirement
1	**Power Sector (G, T&D)**	**11.20**	**16.60**	**5.40**
2	**R.E. Sector**	**3.50**	**13.95**	**10.45**
3	**Power Equipment Manufacturing Sector**	**30.00**	**70 .00**	**40.0**
	Total	**44.70**	**100.55**	**55.85**

The workforce involved in entire Power Industry range from Operators to Electricians, High Pressure Welders, Fabricators, Fitters, Binders, Drillers, Plumbers, Electricians, Linemen, Heavy Machine Operators, Operators-Crane, Dozer, Dumper, Excavation, Bar Benders, Piling Rig Operators etc. required in huge number for the Erection & Commissioning Activities for the Thermal, Hydro, Nuclear Plants, Renewable Energy and Transmission & Distribution areas. The increasing crisis of skilled manpower is impacting various key functions of the industry such as R&D, consultancy, design and detailed engineering work. The key reason for the shortage is the prevailing education system in the country, which generates millions of unskilled candidates for the job market every year. As a result the companies tend to have resources with low skilled technical capabilities in comparison to other leading developing nations.

The split and %ge of manpower in four levels as per Aon Hewitt's Report on "**Talent Projections & Skills Gap Analysis for the Infrastructure Sector (2022)** are:

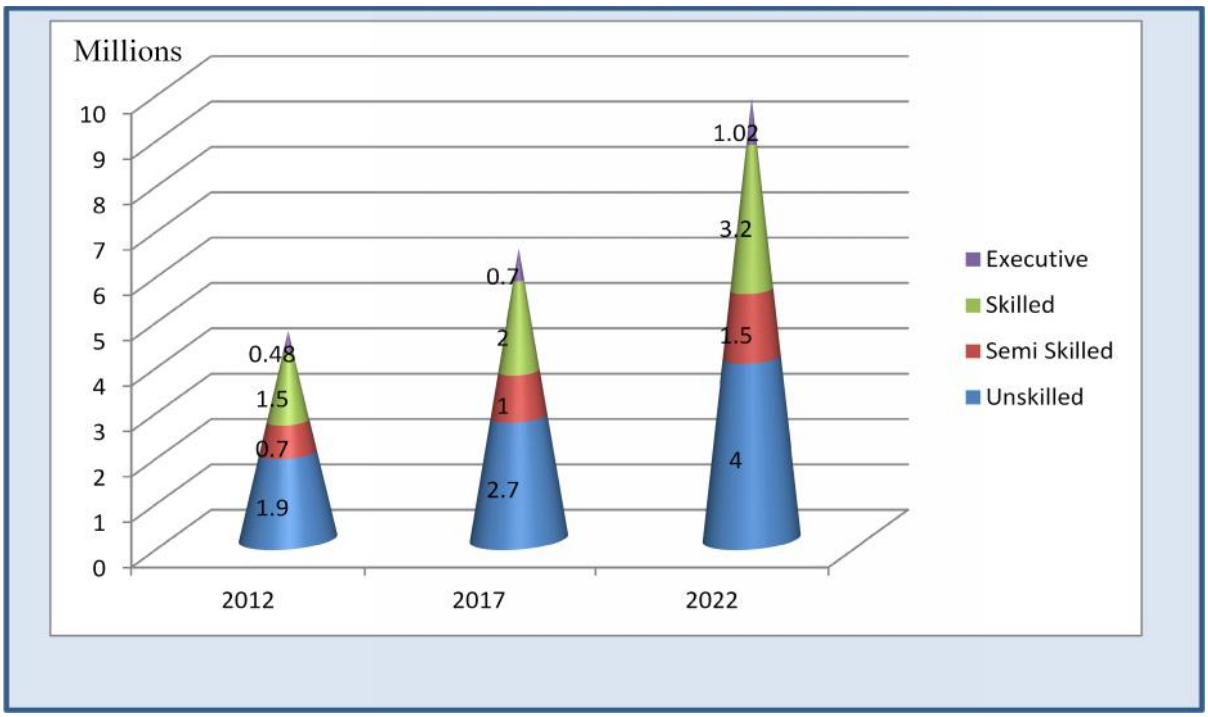
- Supervisors and O&M workforce
- Junior Management
- Middle Management
- Senior Management

Manpower Split in Power Sector



(Source: AON Hewitt Report)

Number of Un-Skilled/Semi Skilled, Skilled and Executives in Energy Sector



There are approximately 300 unique roles in all the three segments under PSSC. For the purpose of skill development under PSSC, Pilot would be run for 10 Roles of the 100 roles as given in the Annexure I. The other roles that exist in the Power Sector would be considered in Phase II for the purpose of skill development.

The Critical Trades for the Power Industry are (as per the 12th plan):

- High Pressure Welders
- Fitters
- Binder
- Drillers
- Plumbers
- Linemen
- Heavy Machine Operators
- Operators-Crane Dozer, Dumper
- Bar Benders
- Electricians

Of the Critical Trades chosen, most of the Trades have been identified as per Working Group for Power for 12th Plan. Some were identified after interaction with Industry professionals based on their knowledge and industry experiences and were vetted by the Chairman CEA. These Trades, if taken up for skill development, would cater to approx. 46% of the workforce in the sector, hence skill development of these would have a major impact on the level of skilled workforce in the industry.

Examples of Skill Gap for critical roles in the Power Industry

S. No.	Skill Required	Skill Gaps
Role	**Plant Electrician (Electricity Generation)**	
1	**Knowledge of :** - Principles of electronic theory as applied to electrical and electronic circuits, variable speed motors - Theory of operation and use of Programmable Logic Control (PLC) units and other computer based equipment for troubleshooting and diagnostics. - Methods to operate state of the art High speed, complex and sophisticated electrical, electronic and communications equipment, wiring installations, including lighting, fire protection and security, electronic controls, automated process technologies and robotics/programming controllers - Safe working practices of the equipments and applicable codes and regulations - Reading blueprints, shop drawings and sketches. - Knowledge of health, safety and environmental regulations and Basic First Aid procedures. - Applicable laws, codes, regulations, policies and procedures. **Skill and ability to :** - Perform preventive maintenance, test and adjust all electrical systems, equipment and components using a variety of electrical test equipment, meters, powered and non-powered tools - Plan the layout of wiring systems, test for, locate and repair malfunctioning; Maintain electrical/ electronic systems for Project facilities and equipment; Perform high voltage switching and operate generators in support of operations. - Assemble and fabricate electrical and electronic components, appliances, connect electrical equipment to power supplies, switches, outlets and other fittings, circuit breakers, maintain automated production processes - Install electrical and electronic control systems, insulated cables, wiring, switchboards, motors, and other equipment according to company electrical standards/codes and environment regulations	• Lack of scientific knowledge of Electrical and Electronic Equipments • Insufficient understanding of safety measures and occupational hazards • Inadequate ability to carry out pre-opertional checks, preventive maintanance and basic trouble –shooting • Lack of training on reading blueprints, drawings, sketches etc. • Lack of knownledge on laws, regulations and policies related to electrical and electronic standards • Lack of knowledge on modern technologies viz. robotics/programmig controllers • Lack of basic lieracy to follow and understand instructions

Role	Power Plant Operator	
	Knowledge of: - Power systems like turbines, boilers, generators and other related equipment in electrical generating stations and substations, switchboards and related equipment in electrical control centres to control the distribution of electrical power in transmission networks. - Knowledge of tools used including their design uses, repair and maintenance viz viz Blowers, Flow-meters —Turbine flow meters, Heat exchangers , Low voltage alternating and direct current AC DC panel boards — Control boards; Panel boards; Transformer controls - Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming - General knowledge of units startup and shut down basic equipment procedures - Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions. - Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal **Skill and Ability to:** - Operate or control power generating equipment, including boilers, turbines, generators, and reactors, using control boards or semi-automatic equipment. - Regulate equipment operations and conditions such as water levels, based on data from recording and indicating instruments or from computers. - Take readings from charts, meters and gauges at established intervals, and take corrective steps as necessary. - Monitor and inspect power plant equipment and indicators to detect evidence of operating problems. - Adjust controls to generate specified electrical power, or to regulate the flow of power between generating	• Lack of scientific knowledge of Power Equipments like Boilers, Turbines, Generators and related equipments • Insufficient understanding of safety measures and occupational hazards • Inadequate ability to carry out pre-opertional checks, preventive maintanance and basic troubleshooting • Lack of training on reading circuts, drawings etc. • Lack of basic lieracy to follow and understand instructions • Lack of training on safety measures while running the plant

	stations and substations. - Ability to read, understand and apply information contained in material safety data sheets. - Ability to interpret data readings and results of equipment checks to identify equipment or process problems. - Perform week PM checklists, Inspect equipment, structures, or materials to identify the cause of errors or other problems or defects. - Operation and Control — Controlling operations of equipment or systems. - Conduct tests and inspections of products, services, or processes to evaluate quality or performance. - Troubleshoot - Determining causes of operating errors and deciding what to do about .electrical power, or to regulate the flow of power between generating stations and substations.	
Role	**Maintenance Person for PowerEquipment**	
	Possess Knowledge of: - Mechanical and operational working complex boiler, boiler water and feed water testing and treatment procedures Includes knowledge of the care and use of hand & power tools and equipment (i.e., precision measuring devices) - Electrical theory and mechanical theory of complex pump and valve operation - Detailed steamfitter/ plumber troubleshooting techniques and detailed steam distribution fundamentals. - Includes basic knowledge of the terminology of various hand & power tools and equipment used at a generating station. Includes machine shop terminology (i.e., lubrication, threading), use of appropriate tools, blueprint reading. System operational parameters - Troubleshooting techniques; - Detailed safety precautions, first aid, clearance, rigging, and grounding. Includes those procedures required to use tools and equipment safely and all safe work practices as they relate to the work environment. **Skill and Ability to:** - Effectively operation, maintenance, repair, inspection and rebuilding of Power Plant steam generating,	• Insufficient Knowledge and understanding of mechanical and Electrical Principles of running the machines • Insufficient knowledge on working of various Power Generation Equipments in the sector • Inadequate ability to carry out basic trouble shooting equipments in case of breakdown • Inadequate training and understanding on use of various equipments to test and inspect the electrical circuits • Lack of ability to interpret diagrams and drawings from service manual

	mechanical and related equipment; inspection, repair and maintenance of steam distribution systems. - Ability to carry out: pump and valve overhaul procedures; steam trap repair procedures; boiler repair procedures; utilization of calibration equipment, basic hand tools and special tools; steamfitter/plumber repair procedures; testing, setup and calibration of electronic, pneumatic components; installation and modification of system or equipment and programming and troubleshooting of electronic devices. - Skill to inspect, overhaul, repair and maintain pulverizes, centrifuges and other power equipment, - Skills to use precision measuring instruments to: check clearances and/or tolerances, to layout work, to establish reference points for inspection purposes, assembling, disassembling, repairing, and assembling of equipment, and when aligning and adjusting parts, components, and equipment according to required specifications. - Ability to read and interpret work procedures and technical information, reference materials, blueprints, and other technical written materials in order to make and repair parts and equipment. - Read & interpret drawings, circuit diagrams and electrical code specifications to determine wiring in the equipments ; Conduct preventive maintenance programs and keep maintenance records - Ability to detect faults electrical defects using appropriate instruments; overhaul, repair, tune, maintain and test equipments; adjust, remove and replace faulty components - Identify needs of the materials and equipment necessary for the equipment on the site and request through the system.	• Lack on training on troubleshooting and preventive maintenance of equipments

Reason for Skill Gaps

- Inadequate Industry Training to a large extent particularly in construction, small manufacturing units and services in power sector.
- Skill requirement for renewable energy technologies are unique in nature and vary widely across different sub sectors. There is a need to rope in Industry experts in the field to work as visiting faculty for the training of trainers.
- Lack of proper communication between training providers and employers resulting in under-utilization of training resources and improper training.
- Limited number of trainers available
- Non availability of well qualified trainers adversely affecting quality of Training of trainees.
- Outdated Content: Fast changes in technology, materials, machinery and equipment manufacturing practices etc necessitate the training content and methodology to be revised and aligned with new requirement.
- It was also found that all sectors are moving towards higher technology platforms hence would need specialized skills across trades, such as, machine operators, welders, supervisors, technicians/engineers among others. As the industry increasingly moves towards the adoption of technology and global best practices, the need for skilled talent will also increase proportionally
- Skills training initiatives - both public and private including ITI (Industrial Training Institute), ITC (Industrial Training Centre) and VTI ((Vocational Training Institute), among others, do not currently cater adequately to the skill demands of the industry.
- No training for non-technical staff: in technology centered organizations like Power Utilities, the training of Non-technical officers and staff is often neglected/ignored as there is inadequacy of trainers and also insufficient training facilities for them in the Power Sector.
- Non-Availability of adequate Training for Hydro Power Personnel: Though more than 19% power comes from Hydro Power sources, very few recognized Hydro Training Institutes exist in the country. The recent establishment of training facilities by NHPC, OHPC and KSEB has eased the situation to a marginal extent.
- Lack of Emphasis on Training in Transmission & Distribution: Although about 80% of the total personnel of the Power Sector are engaged in the area of Operation and Maintenance of Power System, Transmission and Distribution very little emphasis is being given for training activity in these areas.
- Training in Renewable and Non-Conventional Sources of Energy While there is a constant growth in generation of electricity from Renewable and Non-conventional sources of energy, facility for training/ awareness creation in this sector practically does not exist.
- Inadequate access to on job training facilities.

Emerging Trends in Skill Requirements

Human Resource Development and capacity building, in the present power industry demands a very comprehensive and pragmatic approach to attract, utilize, develop and conserve valuable human resources. The Power industry is a capital and technology intensive sector requiring large number of engineers, technicians and other skilled workers. Power projects require specialised technical manpower during the project construction phase as well as the Operation and Maintenance (O&M) phase. Due to the technology intensive nature of the business, technical and managerial competency is critical in ensuring timely implementation of projects and optimum performance upon commissioning. This necessitates induction of significant manpower into the sector.

Technically trained manpower comprising of skilled engineers, supervisors, artisans, and managers etc. is required in every sphere of the power industry. Growing concern over environmental degradation and depletion of the conventional energy sources has made the task of electricity generation even more challenging and therefore quality standard of the manpower is becoming increasingly essential. Even though the country produces a large number of new engineers every year, the technical knowledge acquired from engineering colleges, polytechnics, industrial training institutes and other technical institutions provides the basic foundation, but the same needs to be supplemented with applied engineering skills in the various spheres i.e. power generation, its transmission and distribution aspects. All these skills are to be regularly updated to cope with the rapidly advancing technologies and very often the speed of obsolesce overtakes the rate of acquisition of particular skill and knowledge.

The induction programs currently specified by the CEA range in duration between six to twelve months for engineers, operators, supervisors and technicians based on the technology area. Further, experienced professionals are required for critical activities and it is difficult to augment the number of such professionals in a short period of time. Hence adequate capacity building measures need to be undertaken to ensure the ready availability of manpower required for achieving the plan targets. Further, continuous training should be provided to the current manpower to ensure up-to-date technical skills, higher motivation and productivity.

Training requirements in the power sector include mandatory training after induction, refresher courses for keeping the personnel updated and managerial training to build competencies. The induction level training requires significant time and investment as the fresh graduates lack the technical knowledge specific to the power equipment and processes. As mentioned earlier, the induction training can vary between six to twelve months and it forms the major component of the training needs of the industry. The National Training Policy (NTP), 2002, specifies the training policies for the power sector.

The Report of The Working Group on Power for Twelfth Plan (2012-2017) published by Min. of Power suggests that to address the growing need of capacity building following modules of Training should be imparted to personnel in the power sector:

Training	Details as per Report
O&M Training	As per CEA's Gazette Notification of September 2010 issued by CEA, Engineers, Supervisors and Technicians engaged for O&M of Power Projects (Thermal, Hydel, Gas) and T&D have to mandatorily undergo training ranging from 4 weeks to 30 weeks.
On-job Training Facility	On the job training is also now mandatory for all trainees who are being given training in O&M of Generation Projects (Thermal, Hydel, Gas) and Transmission & Distribution. This training varies from 2 weeks to 16 weeks. Notification from MoP/CEA is proposed so that Trainees being given Training by NPTI can be given On-Job training as per the Gazette notification of CEA.
Induction Training	All technical personnel at the time of induction should be given at least 1 month induction training.
Refresher/Advanced Training	Refresher/Advanced Training must be arranged for each individual on promotion, which calls for performing new/different roles and working conditions. A mix of Technical, Commercial and Management capabilities of 1 week is proposed.
Management Training	Continuous development of Executives/Managers, especially at the transition period of their career and in the context of constantly changing business environment is of utmost importance. Executives in Finance and Management with non technical background should also be provided technical orientation through suitable training programs. For this a training of 1 week is proposed.
Simulator Training	As per the Notification, Simulator training of 2 weeks is a must for Operation and Maintenance personnel of Thermal and Hydro plants. This is included in O&M training above. For safe and efficient functioning of manual and automatic equipment, personnel have to be trained on Simulators.
Training in Renewable Sources of Energy	Since the nature of energy system itself is likely to change in the future, it is essential that renewable energy be integrated into traditional engineering curriculum. Apart from above, it is proposed that specialized training of at least 1-2 months should be given in various renewable energy technologies like solar, wind, bio-mass, small hydel etc.
Training in Demand Side Management, Energy Efficiency and Energy	Training for Energy Managers and Energy Auditors, Top Level Industry personnel, Operators, Farmers, Drivers, General Public & Youth should also be provided in respect of DSM, Energy

Conservation	conservation & Energy efficiency. Energy conservation should also be a part of course curriculum for students.
Power System Operators Training & Certification	System Operators & Engineers should be given regular refresher training and the new entrants should be given exhaustive training of 3 months. This training shall be required to be given to about 250 – 300 trainees every year during the 12th Plan.
Capacity Building under R-APDRP	It is envisaged that around 50,000 employees of various state power distribution utilities will be trained under Part C of R-APDRP scheme with focus on enhancing skills at various levels for efficient management and operation. A provision of Rs. 200 crore has been kept in RAPDRP for capacity building, franchise development and training. It is recommended by the Sub-Group that training infrastructure development of distribution sector at an estimatedinvestment of Rs 2700 crore may be allocated under this scheme for training during the 12thPlan.
National Training Program for Electricity Distribution Franchisee and C&D Employees under RGGVY	It is recommended to continue the training of skill development for existing and potential Franchisees and also to C&D Employees of Power distribution Utilities under RGGVY in 12th Plan as well.
HRD and Technical Competence Building due to Technology Advancement and R &D	In order to match the growth rate, technology advancement and R&D needs both skilled manpower as well as highly qualified research personnel are required to sustain a steady growth in technology development. Thus, emphasis needs to be laid upon skill development of such Manpower.
Introduction of Training on Attitudinal Changes / Behavioural Sciences	It is recommended that training on Attitudinal Changes / Behavioural Sciences may be introduced in the curriculum of induction level training as well as retraining programs. After undergoing such training, the personnel develop a sense of belongingness to the organization. In addition to technical Skills, Power Professionals need to have soft skills like Communication Skills, Time Management, Team Work, Technical Writing, Ethics etc.
Training in Information Technology	Information technology has pervaded all spheres of life. Adequate training according to the job requirement should be provided in the field of information technology. Use of IT should be promoted and maximum number of personnel should be made computer literate.
Opportunities for Higher Studies	Subsequent to the introduction of advanced technology and its widespread use in power sector, Utilities should facilitate its employees by way of up gradation of their qualifications for both technical & non-technical personnel for developing expertise in their area of functioning.

Training of Non-Technical Officers and Staff	It has been noticed that in the technology centered organizations like Power Utilities, the training of Non-technical officers and staff is often neglected/ignored. Training of nontechnical officers and staff should be done on regular intervals in the functional skills/Management areas in association with the concerned Institutes as per needs.
HRD and Capacity Building for Power Generating Stations	It is proposed to have a capacity building program for the Executives, Engineers, and Operators of Thermal Power Stations in both State and Central Sectors in the areas of Energy Management and Energy Audit during 12th and 13th Plans
Training for Nuclear Power Personnel	Due to stringent safety requirements and other national and international regulations, every person working in Nuclear Power Sector is exposed to very specialized training. To meet the multidisciplinary needs, the Department of Atomic Energy (DAE) has built in-house training facilities both for professionals and non-professionals.
Training Abroad	Live liaison should be made with the concerned authorities to depute the eligible personnel for training in the developed countries to keep them updated with the latest global developments.
Hot Line Maintenance Training	There is a great demand from various Utilities for Hot Line maintenance Training. There is an urgent need for augmentation of Training Capacity as this type of Training is presently being imparted by only one institute.
Vocational Training for Youths & Project Affected Persons (PAPs) near Project sites	Training institutes of projects should impart vocational training to youths and Project Affected Persons (PAPs) of neighborhood to make them employable.
Training through Distance learning education & Web based Training	Since it may not be possible for all the Persons engaged in Construction and O&M of Power Projects, knowledge upgradation & training is suggested through correspondence and also by way of Web based Training.

For RE, the skill gaps are sector specific (solar, wind, bio-mass, etc.) as well as generic. The generic skill gaps identified in the RE industry are - Planning & co-ordination skills in project management, erection, commissioning and grid integration of large scale RE projects, installation and commissioning skills and techno commercial marketing skills. These skill gaps can be addressed through common workshops and training programs. Some of the sector specific skill gaps identified include - design and fabrication of biomass gasifiers, erection and commissioning of large scale biomass plants, feedstock planning and management of bio-mass plants, design and installation of BIPV systems, grid integration of megawatt scale solar PV, trouble shooting of solar PV lantern and home lighting circuitry, design skills to match wind speeds and capacity of turbines, installation of large scale turbines, operation and maintenance & failure analysis of turbine gear boxes, GIS / GPS based planning of hydro resources, assembly and trouble shooting of hydro turbines, etc.

The electrical equipment industry plays a very important role not only in GDP growth but also in providing employment in the country. A large number of skilled workers coming out of technical institutes do not possess the required skills and are not employable by the manufacturers of EE. The industry has to spend time and money on their training. As per report of Ministry of Heavy Industries and Public Enterprises, Deptt. Of Heavy Industries (DHI) titled "Indian Electrical Equipment Industry Mission Plan 2012-2022: Base Document", the quality of knowledge possessed by graduates and diploma-holders coming out of most private institutes is very poor especially in the case of engineers and supervisors where the situation is quite alarming. The technical education being provided in ITIs, polytechnics and engineering colleges does not meet the expectations of the industry. This is one of the major reasons for the low productivity of manpower in India as compared to other economies. There is a need to consolidate data regarding the number of skilled workers required in different regions of the country.

Some of the large manufacturers of electrical equipment and central utilities have set up their own skill development centres and are able to train the skilled manpower as per their own requirement. However, 90% of the T&D equipment manufacturers are in the SME sector and are widely scattered all over the country. Therefore, this industry faces a serious problem in getting trained manpower for their operations. At present, there is no formal mechanism to identify the type of skilled manpower required in a particular district/state and country. The quantum of skilled manpower required for different trades by different industries is also not known.

Though the Power industry has multiple skill requirements, as per the assessment of Manpower in 12th and 13th Five year plan, the ratio of technical and non technical personnel would be 76:24. Currently the government's skill training programmes are not market driven and there is a huge in the gap in academic curriculum vis-à-vis the market requirement. There is urgent need for upgrading the course content and syllabus, to be in tune with the technological development in Power industry. The present technical education system is not geared to supply the manpower to precisely suit the Power industry. A drastic revision of the current curriculum of technical institutions and more practical courses specific to the Power industry at all levels, are called for. Increased awareness amongst the younger generation about the Power industry as a career choice is vital. This can be done by increased publicity at colleges, seminars, exhibitions and better industry and institution interaction. Though talent is not an issue, lack of trained, skilled manpower in relation to Power Industry and equipment is a major concern in India.

Smart Grid Implementation : The Power Industry is in for a complete switch into the next generation through automation and implementation of Smart Grid Operations. "Smart grid, being a concept with hardware, software and interconnection elements, is complex. Without effective standards, efficient realisation of smart grid in India would be difficult'Ministry of Power has shortlisted 14 Smart Grid projects. For India to continue along its path of aggressive economic growth, it needs to build a modern, intelligent grid. This would bring more emphasis will be on overall development of T&D efficiency based on demand response, load control and many other Smart Grid technologies. To tackle the Smart Grid future, there is a need to have compelling Smart Grid consumer products, collaborative vendor

partnerships and a willing investment community. To drive the smart grid development in India, IEEE-SA is dedicated to working with industry professionals, academia and government officials. IEEE-SA is focusing on creating awareness and educating about smart grid through various workshops and panel discussions across the country. IEEE-SA is actively growing its engagement in India to educate, and promoting Smart Grid Standards interests in the country. IEEE-SA have conducted outreach programs to directly interact with Indian companies in order to focus on the field of power, communications and information technology, to solicit their interest to participate in IEEE standards projects. All this would involve different kinds of skill development in IT, Technology and other functions.

Participation and efficacy of training by Govt. bodies and Institutions in Power Industry

Basically three types of training infrastructures/facilities are available for personnel in the Power Industry:

1. Training institutes recognized by CEA for imparting statutory induction training: There are Seventy Four Training Institutes recognized by CEA under various Power Utilities. These institutes mostly cater to the induction training needs of thermal power stations.
2. Lineman Training Institutes: A good number of the SEBs have at least one lineman-training center. But they are quite inadequate vis-à-vis the enormous need. Also the quality of these centers is often far from satisfactory.
3. Other Training facilities (Class/board rooms for refresher/ management programs) including networking with academic/training institutions outside power sector
4. Similarly CBIP is also conducting Power Industry interfaced, long term programs ,Viz, PGDC Thermal Power Plant Engineering and PGDC in Transmission and Distribution. A dedicated training Institute namely CBIP, Centre of Excellence at Gurgaon shall be operational shortly. These products should be gainfully utilized in the reforming power sector. Many power sector organizations (e.g. : NTPC, NHPC, Power Grid etc) have developed regular tie up with institutions like IITs, IIMs, MDI etc. for providing necessary knowledge and skill inputs to their personnel.

As per Report of The Working Group on Power for Twelfth Plan (2012-17) published by Ministry of Power in Jan, 2012, Training to the power sector personnel is provided in the following categories :

1. O&M Training to all existing employees engaged in O&M of generating projects and Transmission & Distribution System as per statutory requirements under the Gazette Notification of September 2010 issued by CEA ranging from 4 Weeks to 30 Weeks.

2. Induction level training for new recruits for 1 month (Technical & Non-Technical) is considered a must in the power sector

3. Refresher/Advanced training of 5 Days in a year to all existing personnel of varying degrees in various specializations in line with National Training Policy for Power Sector.

4. Management training of 5 Days in a year to the senior Executives/Managers in

India/Abroad in line with National Training Policy for Power Sector.

List of the some of the PSUs and other training organizations offering Training for Power Industry

S. No.	Name of Institute	Programmes Conducted
1	**National Power Training Institute,** Operates on all India Basis through 9 Institutes in Different Zones NPTI has one 500 MW Thermal Training Simulator, Two Nos of 210 MW Thermal training Simulators, one 430 MW (2x143 MW Gas Turbine and 1 x 144 MW Steam Turbine), Combined Cycle GasTurbine Simulator, one No of Hydel Simulator and one No of Load Dispatch Simulator.	1) Two-Year MBA in Power Management approved by AICTE 2) Four-Year B.Tech./B.E Degree in Power Engineering approved by AICTE 3) One-Year Post Graduate Diploma Course in Thermal Power Plant Engineering 4) One-Year Post Diploma Course in Thermal Power Plant Engineering 5) One-Year Post Graduate Diploma in GIS and Remote Sensing (RS) 6) Nine Months Post Graduate Diploma Course in Hydro Power Plant Engg. 7) Six Months O&M of Transmission and Distribution System for Engineers 8) Distance Learning Certificate Programs on Power Distribution Management for JEs/ AEs level Advanced Certificate in Power Distribution Management (ACPDM) 9) Certificate of Competency in Power Distribution (CCPD) The course is meant for Technicians/Equivalent Trade or manpower working in Power Sector
2	**Power Management Institute (PMI) & other training institutes of NTPC: NTPC has 11 No of training institutes at its Project Sites**	➢ Imparting training in the fields of management development, construction and O&M of power plants and information technology.
3	**Training Institutes of NHPC, Training Institutes at Project Sites**	
4	**Training Institutes of PowerGrid, has Training Institutes at its Regional locations/Project Sites**	

5	**Neyveli Lignite Corporation**	
6	**Other Training Institutes :** Reliance Energy Management Institute, Mumbai, Jindal Institute of Power Technology, Raigarh, Noida, Chattisgarh, Evonik (Steag), Gujarat Energy Training & Research Institute, Vadodara	
7	**Central Board of Irrigation & Power (CBIP)**, Main Institute at Malcha Marg, Chanakyapuri, New Delhi and branches at Guwahati and Bhopal New Institute CBIP Centre of Excellence is ready for operation	1) One year Post Graduate Diploma Course in Thermal Power Plant Engineering 2) Six months O&M of Transmission & Distribution System for Engineers 3) Conducting Short Term/Long Term Programmes in Thermal, Hydro and Latest Technology 4) Conducting Seminars/Workshops in the Hydro and EHV areas 5) To start 2 year MBA in Power Management very shortly
8	**Rural Electrification Corporation Ltd.,** Main Office, Lodhi Road, New Delhi; Mainly training centre at Hyderabad	➢ Conducting Technical and Management Programmes at all Levels.

Additionally, Associations viz. IEEMA, REC, CIDC etc. also offer courses related to Power Industry.

Some of the major Universities / Institutes offering RE related Courses

S. No.	Name of Institute	Location	Name of Course
1	University of Lucknow	Lucknow	➢ M.Sc Renewable Energy
2	University of Kota, Kota	**Kota**	➢ M.Sc,/M Tech Energy Studies
3	University of Pune	Pune	➢ M.Sc,/M Tech Energy Studies
4.	Indian Institute of Technology, New Delhi	New Delhi	➢ M.Tech Energy Studies, Energy & Environment Management

5	Indian Institute of Technology, Mumbai	Mumbai	➢ Courses in Renewable Energy
6	Indira Gandhi National Open University	New Delhi	➢ Diploma Renewable Energy Technologies
7	Jadavpur University,	Jadavpur	➢ M.Tech, /Certificate Energy Science and Technology, Energy Management and Audit
8	University of Petroleum and Energy Studies,	Dehradun	➢ M.Tech Energy Systems
9	Kurukshetra University,	Kurukshetra	➢ M.Tech Environment & Energy Management
10	TERI University	New Delhi	➢ Master of Technology - Renewable Energy Engineering and Management Doctor of Philosophy - Energy and Environment

In total there are 61 Universities across the country offering Courses in Renewable Energy

Some of the major Universities / Institutes offering related to Electrical and Electronics Equipment Manufacturing Courses

S.No.	Name of Organisation	Location	Name of Course
1	IEEMA	New Delhi	➢ Proficiency Diploma in Electrical Insulation Technology
2	IITs	Various Locations	➢ B Tech Electrical ➢ B Tech Electronics and Communication
3	Jadavpur University	Jadavpur	➢ Electrical Engineering
4	Birla Institute of Technology and Sciences,	Pilani	➢ EEE
5	Institute of Technology, Banaras Hindu	Varanasi	➢ EEE

	University,		
6	Indian Institute of Technology,	Guwahati	➢ EEE
7	ISEEE – Indian Society of Electrical and Electronics Engineers	Madras	➢ Electronics Engg, Electronics &Communication Engg, Telecommunication Engg, Electronics and Instrumentation Engg, Instrumentation and Control Engg, Electronics and Control Systems, Electronic and Telematic, Applied Electronics and Instrumentation, Bio Medical Engg, Electrical and ElectronicsEngg, Instrumentation Engg, Industrial Electronics, Medical Electronics, Computer Engineering, Computer Science Engineering, Information Science, Information Technology, Instrumentation Technology, Computer & Information Technology, Computer Applications, Electronic and Computer Engineering, Electrical Engineering, etc.,
8	Vellore Institute of Technology	Vellore	➢ EEE

BE/B. Tech in Electrical, Electronics, Communication and Instrumentsion, Compuer Science MEchanical, Industrial Elecgtronics, Production is offered in most of the Government Colleges (e.g. Government College of Engineering, Salem, A.C. College of Engineering & Technology, Karaikudi, Government College of Technology, Coimbatore, Government College of Engineering, Bargu, Government College of Engineering, Kannur University, Keral, National Institute of Technology, Warangal, Punjab Engineering College, Chandigarh) and Private Colleges, ITIs also run courses for Electricians, Electronics, Welding,

Examples of Training provided by Utilities companies

1. **TATAPower – DDL** : TPDDL has set up a training institute, Human Resource Development institute (HRDI) and its state of the art, training center, ***CENTRE FOR POWER EFFICIENCY IN DISTRIBUTION (CENPEID*** in the Rohini, Delhi, to cater to the diverse T&D needs of its people. The Learning and Development of their workforce is facilitated through various mechanisms like: Short and Long duration training programmes at CENPEID.
   - Sponsorship for professional courses and skill upgradation (ITI, AMIE and MBA)
   - Executive Development Programmes for Middle and Senior management in reputed institutes.

- Exposure to live projects and task forces.

TPDDL also reaches out to the employees of other organizations in the same field in power and In the last 5 years has catered to over a 1000 participants from various Indian as well as Overseas utilities. CENPEID, has become a ***Center of Excellence*** in electricity distribution sector for imparting technical, behavioral and leadership training & development. CENPEID, the training institute of TATA Power - DDL, is a recognized & approved Resource Centre for Training & Development programs sponsored by Ministry of Power (MoP), Govt. of India (GoI). CENPEID has a unique distinction of having conducted maximum no. of DRUM training programs in last 5 years, having covered 10000+ training mandays.

2. Power Grid Corporation : has world class training facility, programs range from technical training in various facets of transmissom, distribution, Finance, Environmental and social studies. Has academis and technical tie ups with IIT Delhi, MDI Gurgaon, Amity, BIMGTECH, NPTI etc.
3. Hot Line Training Centre(HLTC) located at Bangalore, is the oldest Institute under National Power Training Institute (NPTI). It is the only one of its kind in South Asia. Established in 1958, training at HLTC enables trained personnel to attend to maintenance works on Transmission Lines and Switch Yards without power interruption. Since its inception HLTC had trained more than 3000 personnel including participants from Sri Lanka and Afghanistan in the field of Live Line Maintenance Techniques. HLTC imparts training on Live Line Maintenance of EHV Lines & Switch Yards, Punctured Insulator Detection, Live Line Insulator Washing etc. All the Power utilities in the country can make use of these training facilities.
4. Power System Training Institute (NPTI)**,** BANGALORE conducts Despatcher Training on Simulator (One week). This provides hands on training in System Operation aspects with exposure on generation, transmission, distribution, protection, electricity markets and management.

Size of Unorganised Industry in Power Sector

There are large numbers of unorganized industries particularly for providing services for repair, maintenance, sale etc of power equipment in commercial and household areas. In case of renewable energy sources, the generation resources in rural areas are very much distributed in small unit capacities spreading fast to new areas. The technologies are undergoing changes, resulting in engagement of large unorganized industry and workforce. However, in case of power generation, transmission and distribution, the size of unorganized industry and workforce is comparatively lower. For Power Sector, the major component of unorganized industry is in construction segment. As already mentioned for manufacturing sector, the unorganized component of manpower is presently about 15.0 Lakhs which will go up to 35.0 Lakhs by the year 2022. In case of renewable energy sector, if one worker per village is taken, the estimated manpower required in unorganized industry is about 6.0 Lakhs. Employers in unorganized sector because of economies of scale do not spend or focus on trained Operators and Maintenance People; they invariably train people on the job with no formal training whatsoever, resulting in major opportunity for skill development.

Global Best Practices for Skill Development in Power Industry

This should include details of SSCs of your Industry Sector, if functional in any country. Include a brief analysis of the Best Practices and their relevance to your Sector at the end. Response not to exceed two pages. Please make optimal use of graphs, charts and numbers.

Global Practices for Education and Training

ILO:

The European Commission (EC) and the International Labour Organization (ILO) in 2011 concluded a joint management agreement on *Knowledge sharing in early identification of skill needs for the low-carbon economy* with the aim of enhancing cooperation and knowledge-sharing in the field of early identification of skill needs in renewable energy and came out with a report titled "Skills and Occupational Needs in Renewable Energy 2011. International Labour Office • Geneva EUropean commission. The focus was to analyze and address the shortage of green-collar professionals with cutting-edge skills in energy efficiency, green engineering and green construction. The main conclusions of the report were:

- Plans by governments and others to develop renewable energy projects require a skills component
- Pacing investment in renewable energy to smooth employment over time can benefit renewable energy businesses and employees by preventing booms and busts in demand for skills
- Smaller renewable energy projects require skilled crafts workers with sufficient breadth of skills to be able to do the work by themselves, or at least to cooperate effectively with others
- There is a need for effective skills anticipation in renewable energy, and there is a particular need for developing countries to plan to maximize the local employment benefits of renewable energy projects;
- Initiatives to develop skills for renewable energy should aim to develop skills that are sufficiently portable so that they can be applied to new renewable energy technologies and outside the renewable energy sector;
- There is scope to provide internationally recognized industry certifications in renewable energy skills to complement national qualifications;
- There is a need for policy to focus on ensuring that the transition to renewable sources of energy is a Just Transition for those working in fossil energy sectors;
- There is a need for policy-makers promoting the transition to renewable energy to take account of Decent Work principles when designing policies and interventions;
- Large-scale renewable energy projects in developing countries should operate effective corporate social responsibility strategies;
- Social dialogue has an important role to play in the design and delivery of skills interventions for renewable energy
- There is a need for a range of initiatives to increase the supply of trainers.

In support of this many countries are working towards skill development in Power Generation and Renewable Energy Resources.

Scotland

In Scotland Energy Advisory board was set up especially with a focus to review future skills and employment demands across the sector which involved engagement with a comprehensive range of partners and stakeholders, working collaboratively with industry to review existing forecasts, analyse gaps and build future employment models. The main skill requirements were identified as engineers (especially civil, marine, engineering, structural and mechanical), leadership and management, project welders, turbine technicians and divers.

Scotland's colleges have established the Energy Skills Partnership (ESP) with support of the Scottish Funding Council to co-ordinate the group and act as a link to the relevant industry associations, government agencies, universities and awarding bodies. The role and remit of the Partnership is to provide a flexible and responsive, collective collaboration and dialogue with industry, government and universities on all sub-sectors of the Energy Industry and build links with key agencies such as: Renewables UK, Scottish Renewables, OPITO, National Skills Academy for Power, Scottish Enterprise Highlands and Islands Enterprise, Skills Development Scotland, Scotland Development International. The ESP Undertakes audit of skills, resources, capacity and capability across Scotland's colleges, work towards development of new qualifications and training materials as required, enabling transferable skills provision and the generation of wider knowledge transfer opportunities to transform the landscape for business growth and employability within the sector, hence providing a flexible and sustainable workforce for industry. It also works in partnership across colleges and the relevant industries to facilitate cross-sector "short apprentice exchange" opportunities for trainees. National specialist centres have been established and are recognized in key skill areas and industry will be extensively consulted on and involved in the development of provision, as appropriate. Employers committed to comprehensive workforce development, world class training organizations such as OPITO and academic collaboration with Industry in the form of the Energy Technology Partnership all form part of the skills infrastructure they also have an extensive network of Colleges and private training organizations, which support the sector through the delivery of valued vocational training including the Modern Apprenticeship programme.

Queensland, Australia

Energy Skills Queensland which is responsible for skill development for Queensland's energy and telecommunications industries has made strong investment in Australia's energy and resources industry to exacerbate skills shortages in critical occupations and to facilitate and drive a collaborative approach to workforce planning and workforce development within the industry bringing together key stakeholders. To achieve this, Energy Skills Queensland partners with industry, contractors, education training organisations, and corporate groups across our industries, while engaging with other key stakeholders such as government, regulators, unions and other industry peak bodies to ensure solutions

provide a holistic outcome to meet industry expectations.to identify and provide solutions for the skilling needs of industry, They have brought together energy enterprises and governments to work together to ensure industry has the staff to deliver what customers demand.

Queensland Workforce Skilling Strategy (QWSS)

The QWSS is a workforce development, training and employment strategy for new entrants to the Coal Seam Gas to Liquefied Natural Gas industry and provides a holistic approach to addressing shortages of workers. In 2006 CS Energy, Stanwell Corporation and Tarong Energy approached CQUniversity(CQU), Queensland University of Technology(QUT) and The University of Queensland (UQ) to develop and deliver a world class curriculum specifically designed to accelerate the technical competency of engineers and para-professionals working in the Australian power sector. The three partner Universities have collaborated to develop a world-class postgraduate program, which has been designed to meet the needs of the Australian power industry and its current and future workforce. The Power Generation Skills Development Program over three years offers professional engineers and those operating in para-professional roles the opportunity to accelerate their technical competency and fast-track their career in the power sector. The program addresses 47 priority skill areas identified by industry as necessary for the expert development of their current and future workforce. These areas are addressed via 16 specialised courses, developed and delivered collaboratively by the partner universities. Students can undertake these courses by enrolling in a Master of Engineering (Power Generation) and/or Graduate Certificate (Power Generation) at any of the partner universities. CQUniversity also provides a Graduate Diploma (Power Generation) option. Students can undertake a Master of Engineering (Power Generation) and/or Graduate Certificate (Power Generation) at any of the partner universities. CQUniversity also provides a Graduate Diploma (Power Generation) option.

Brunswick, Canada

The Province of New Brunswick has an energy sector workforce development strategy to provide skilled energy workers. The Department of Post Secondary Education, Training and Labour works closely with labour, industry, New Brunswick First Nations, economic development agencies, communities and their post-secondary education system to build workforce for the energy sector. Following initiatives are planned:

Energy Certificate Program – In collaboration with the Department of Energy, industry, labour and other stakeholders, the University of New Brunswick plans to pilot an Energy Certificate professional development program.

Energy Literacy - The Province of New Brunswick is in the process of developing a centralized source of energy information as a knowledge resource for residents. A supporting education and awareness campaign will also be developed with multiple information tracks and delivery channels geared towards students, the public, New Brunswick First Nations and commercial and industrial users. There may also be opportunities to consolidate these plans with a planned national energy literacy initiative in a way that brings further benefits to New Brunswick.

Energy Institute, London, UK

In support of the Skills need in the energy industry, the Energy Institute Norman Broadbent and Deloitte conducted three surveys and published how to build executive talent in the energy industry and how to review the skills issues affecting the sector with science, engineering and technical (SET) skills particularly affected. The Energy Institute (EI), Norman Broadbent and Deloitte undertook the research to establish the scope of the problem and the level of awareness among energy companies of this potential threat to their business activities and came out with Recruitment strategy for a sustainable future

Recommendations for the energy industry**:**

- Raise the profile of the energy industry as one of the most exciting to work in to combat increasing competition from other industries for these shortage skills – the sector needs to be well presented to young people as a prime career choice.
- Re-skill and cross-train existing or new staff to combat the decline in scientific, engineering and technical (SET) skills – support for training organisations, particularly universities, is critical if those organisations are to meet industry needs on high level skills.
- Get the rewards right for engineers and technical specialists in order to combat decreasing numbers of SET graduates choosing to enter a SET career – SET careers need to be seen as attractive and financially rewarding to compete with 'high flying' roles in finance, management and law.
- Develop new and potential graduates at an early stage to combat lack of experienced hires for key roles in an expanding industry – employers need to be more innovative in their methods of training and development, looking for efficient and effective ways of benchmarking employees' competence and giving them the experience and support to develop those skills.

Overview of the Power Sector Skill Council of India

Please revisit the mandate of NSDC (Pg 7). What do you think should be the broad activity segments of your SSC? Write them down in bullet form in the space given below:

Now that the first level of segmentation is done, please take each of these segments and discuss them as follows:

1. Segment # 1
    - o Description of the segment – (50 words)
    - o Main activities undertaken by this Segment - two sentences on each activity. If there are activities under these, list them as bullets. (Similarly discuss each segment)

The Power SSC will broadly carry out the following activities:

1. Bring **uniformity and standardisation in the various skill types / job roles** and the competencies required for those job roles in the industry, through **development of National Occupational Standards (NOS)**.
    - Create a common understanding through extensive interaction with all stakeholders of the various skill types and job roles required in the industry.
    - Emphasize on the need to build competency/outcome related occupational standards rather than designation based job descriptions.
2. **Identification of critical job roles where major skill gaps exist** and plan for future skill development initiatives to focus on addressing these gaps.
    - To prepare a catalogue of type, range and depth of existing skills already
    - Standardize catalogue of type, range and depth of skills as per skill development needs
    - Identify the major pain areas of the industry and focus Phase I on those skill sets with shorter turn-around time for a faster redressal of issues.
    - Focus marketing effort to attract adequate numbers for identified skill gap areas.
    - To develop the competency standards (detailed listing of knowledge, skills and attitudes including technical and soft skills that a worker must possess to perform a task) for each trade and level.
3. **Develop and/or collate appropriate courses and curriculum** to address the needs for skilling as per the NOS developed .
    - Invite quality training vendors to create courses/modules, for the NOS developed according to the competency development framework.
    - Identify new technologies and areas impacting skill requirement in the Power Industry
4. **Plan and execute Training of Trainers** and ensure adequate faculty to support the capacity building in skill development programs
    - Plan for the number of trainers required to carry out the SSC training plan for the next 5 yrs and proactively organise and supervise training directly or through quality vendors.
5. **Build affiliation and accreditation process** for institutions and examination and certification process for trainees.
    - Build a robust and scalable process of assessment and certification of Trainers and Trainees.
    - Identify and partner with institutions who can be accredited to carry out the activity on SSC's

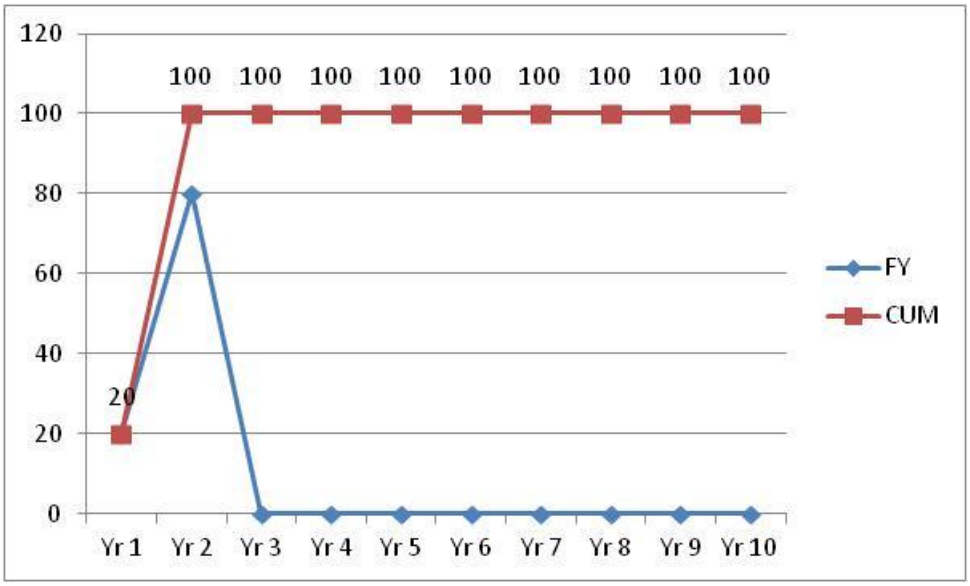
behalf to build scale.

6. **Encourage maximum participation of private training institutions** to run certified programs as per the competency framework developed by the SSC and thus continuously meet the annual skill development targets according to the sector skill development plan.
    - To evolve a mechanism in association with the industry to ensure that only certified workforce is deployed.
    - To provide consultancy to the industry.
    - To carry out research in the area of skill development.

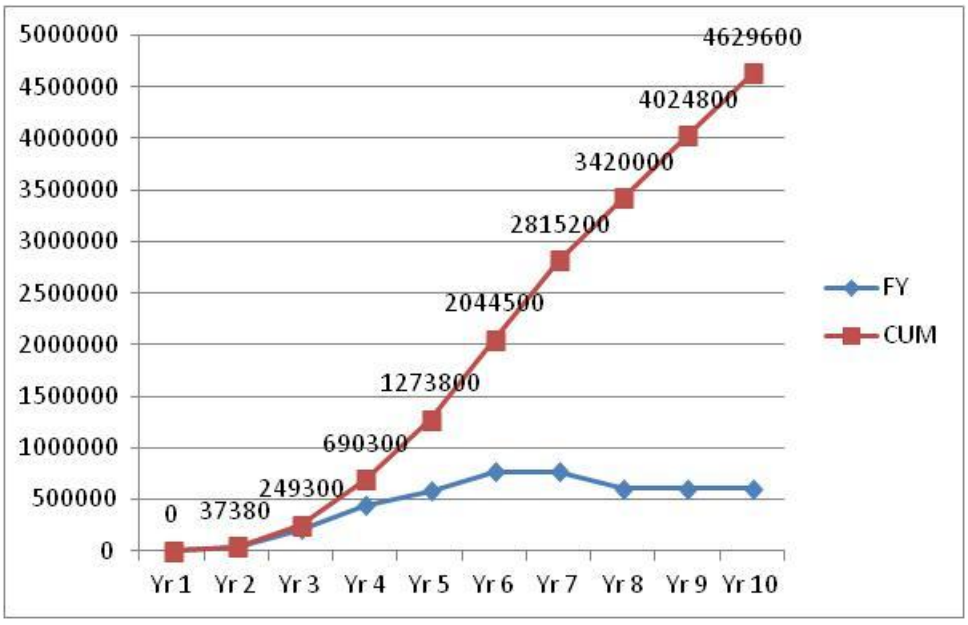
7. **Enable maximum employment of SSC certified personnel** instead of unqualified people within the Power Industry.
8. Establishment of a well structured, sector specific **Labour Market Information System (LMIS)** to assist planning and delivery of training.
    - Identify suitable partners to carry out the initial research activity and create an IT enabled platform for the LMIS. Create a process for regular updation of the data through local representatives of the SSC in every state, subsequently.

NATURE OF LIKELY IMPACT

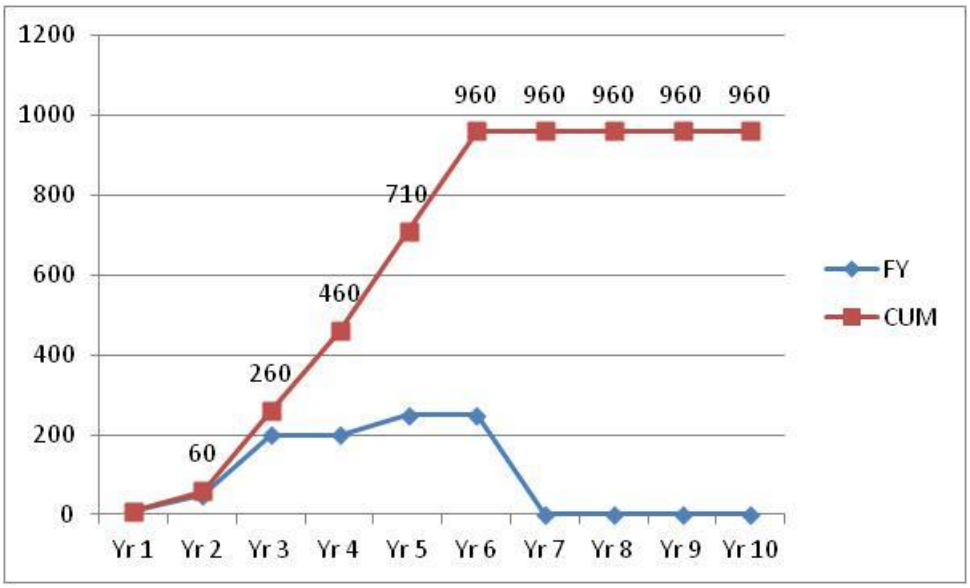
Total Number of Job Roles included for Skill Development: 100



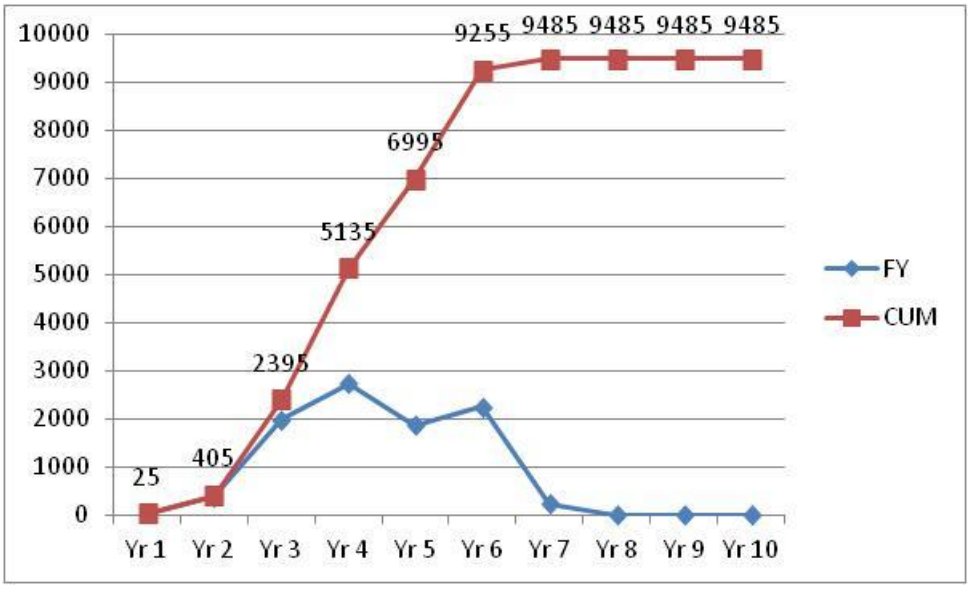
Number of people certified in 10 yrs (approx) 46.29 lakhs



Number of Training Institutes certified over 10 yrs - 960 nos.



Number of Trainers trained (approx) over 10 yrs – 9,485 nos.



Operating Model of the Power Sector Skill Council of India

Please indicate the details of the overall plan for setting up the SSC. It will be helpful to indicate how NSDC funding will be used in fulfilling the requirements and in achieving sustainability for the proposed plan. Any supporting documents should be attached as Annexures.

1. Overall plan details for the Sector Skills Council (kindly articulate the overall plan including organization structure, governing body and governance, the number of 'unskilled manpower' and 'in service manpower' to be trained, rollout plan, role of various partners; word limit of 100 words)

The Power Sector Skill Council (PSSC) shall be set up as a society under the Society Registration Act 1860. It will be managed by a Governing Council consisting of members from all segments of Power Industry. PSSC society would be registered with 7 initial members. In the first meeting of PSSC after the registration, it would elect members from the stakeholders including NSDC, Ministry of Power, Central Electricity Authority, Ministry of New & Renewable Energy, IEEMA, National Skill Development Corporation and key players from Power generation, transmission, power system operation, distribution, trading, regulation, equipment manufacturers, research & development, financing, training, construction agencies and academics who shall be part of Governing Board of the Power Sector Skill Council Tenure for society members could be 2 years. Industry associations in unorganised segment, and IIPs would also be inducted in the PSSC organization in some capacity so as to broad base the PSSC and to achieve the objective of skill development of all segments of power industry. It will be managed by a Governing Board consisting of 23 members, as follows:

S. No.	Sector	Nos.	Remarks
1 a	**Power Generation**	**2**	**Elected: 1 from PSU and 1 from Industry.**
1b	**Power Transmission**	**2**	**Elected: 1 from PSU and 1 from Industry.**
1c	**Power Distribution**	**2**	**Elected: 1 from PSU and 1 from Industry.**
1d	**Power System Operation**	1	**Elected**
1e	**Representation from States (one from each Region)**	**5**	**Nominated by State Government States to be Rotated after 1 year**
2	**Renewable Energy**	**2**	**Elected from Industry**
3	**Manufacturing sector**	**2**	**1. IEEMA 1. Elected from Industry**
4	**Construction Sector**	**1**	**Elected from Industry**

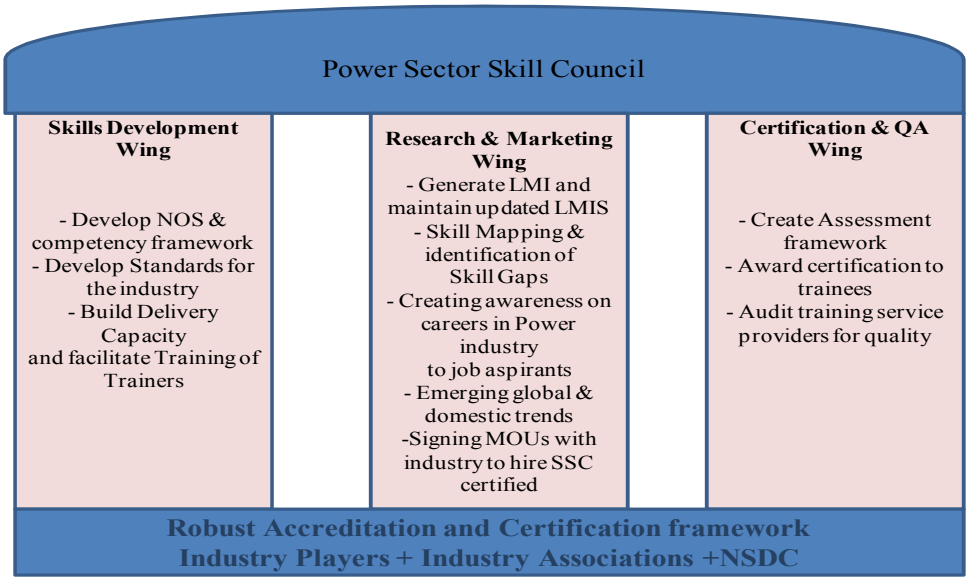
5	**Government of India**	**2**	**MNRE CEA**
6	**Training Institutes**	**2**	**1 CBIP and 1 Elected**
7	**Skill Development**	**1**	**Nominated by NSDC**
8	**CEO as ex-officio Secretary**	**1**	**Nominated**
	TOTAL	**23**	

An Advisory Committee will advise the Governing Board on specific issues related to governance, government policies linked to the Power Industry and specialized functional matters. This will consist of domain knowledge experts in various disciplines, prominent personalities from the Industry and representatives of other major players from Power Industry.

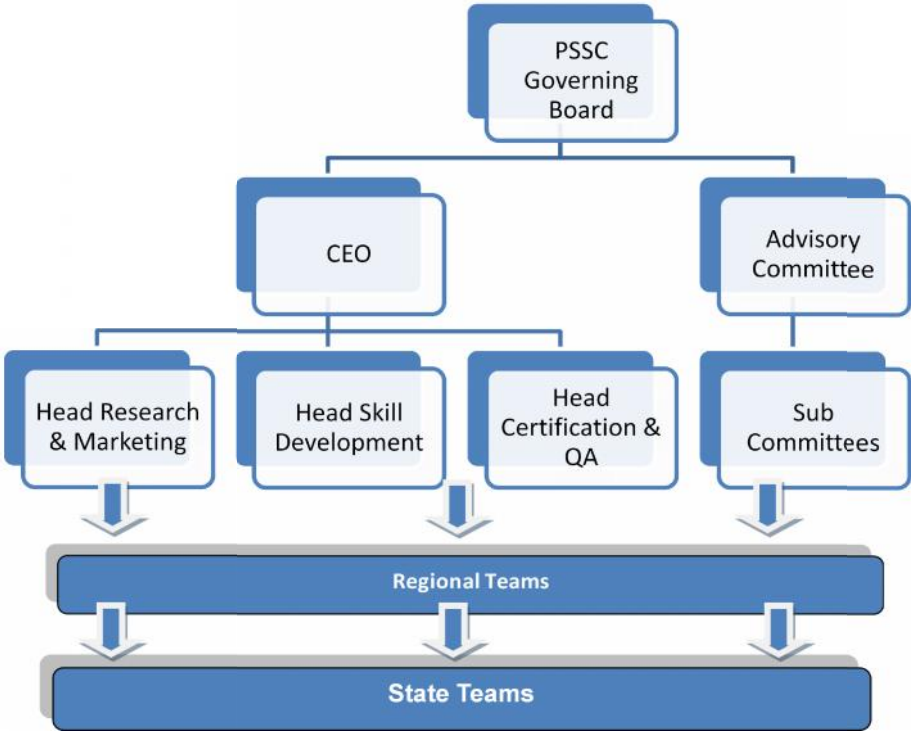
A full-time CEO will be appointed by the Governing Board for carrying out the operations of the PSSC. He will be assisted by a hired team of full-time professionals with relevant knowledge and experience, hired from the industry. This executive wing of the SSC will comprise of three main functions, each headed by a senior professional aided by adequate support staff :

a) Head – Research & Marketing
b) Head – Skills Development
c) Head – Certification & QA
d) Other support staff

This central team will be supported by Regional Teams.



Proposed structure of the Power Sector Skill Council



2. Method of operationalising a sector skill development plan, and linking it to a competency based training framework. Use of consulting support envisaged, if any. (please specify in a word limit of 100 words).

The Sector Skill Council would serve as a nodal / apex body for developing and regulating skills in the Power Industry. However all activities such as Primary Research for Labour Market Intelligence, Development of Occupational Standards, etc would be contracted to vendors / partners who have the expertise for that particular activity and has a task oriented Project Management set-up. The initial support and other facilities required for setting up of the PSSC and the registration of PSSC as a society shall be provided by CBIP and the PSSC shall be housed in their premises at Malcha Marg, Chanakyapuri, New Delhi-110021. A CEO, his team and the supporting staff would be engaged to take care of the day-to-day working of the SSC.

Operationalising Sector Skill Development Plan

Skills/competency standards and qualifications required for various trades shall be identified and formulated for which a consultancy firm having wide ranging experience in the area shall be engaged for formulation of competency standards and qualifications. Thereafter the training facilities already available and those required for the balance skills shall be identified. An overall plan for providing these training facilities shall be worked out and put in place.

The PSSC will initially focus on 10 identified critically short skill sets from the industry. Occupational Standards and competency framework will be developed for these skill sets and three training partners will be invited to develop their curriculum, train the trainers and run pilot training batches in different regions to assess the efficacy and suitability of the program. Subsequently the program will expand to include almost 100 different skill sets for which NOS and training curriculum will be developed, training programs conducted and assessment and certification done under the aegis of the PSSC. It is expected to train approx 9,485 trainers and skill almost 46.29 Lakhs people under this program, including the In-service manpower, in the next 10 years through 960 training centers. Keeping in view the challenges of providing training/skill development, in the unorganised sector and for training those who are illiterate, semi-literate or unskilled/semi-skilled, PSSC has taken a realistic figure of training approx 46.3 Lakhs people out of the total workforce (current + projected) of 100 Lakhs till 2022. Since Power Sector is the most organised of the 3 segments hence the %ge of people to be certified for the incremental requirement has been taken at 75%. The Renewable Energy is lesser organised than the Power Sector hence the the %ge to be certified has been taken as 70% and since the Manufacturing Segment mainly comprises of unorganised units, the %ge to be certified has been taken as 65%. All the Sectors puts together would give an overall 67% coverage of the incremental requirement. Additionally, 20% of the in-service workforce would be covered for certification. Detailed Project Report (DPR) will be submitted by the PSSC after the completion of the Pilot phase of the project in the third year of formation of the PSSC. The PSSC will interact widely with all stake holders through its members, committees and promoters' bodies and sign MOUs with leading industry players and other stake holders.

The pilot phase will be followed by replicating relationships with a few competent accreditation partners and certification of reputed training institutes in every region to carry out TOT as well as further training of candidates. Marketing awareness will need to be created with the efforts of the NSDC to impart information about the opportunities in the Power Industry sector to attract suitable candidates in adequate numbers. The PSSC may also need to facilitate availability of soft loans for education as well as setting up/up gradation of existing training institutes through banks and NSDC respectively. Re-skilling, certification and skills up gradation of candidates who are already on the job will also have to be taken up after the pilot phase.

Proposed PSSC Strategy to overcome the challenges

The key reason for the shortage is the prevailing education system in the country, which generates millions of unskilled candidates for the job market every year. As a result the companies tend to have resources with low skilled technical capabilities in comparison to other leading developing nations. The sluggish government Infrastructure by the time, it thinks to upgrade any training facility by a notch, the Industry requirements quite often would have gone up by 3-4 notches hence the need for PPP measures to build skilled workforce. PSSC will strategise training and skill development by taking the following actions:

- Coordinate the efforts of the Training Providers, trainees, employers, Planning and Policy makers to

fulfill the training and skill development requirement of the Power Industry. Currently, there is lack of proper communication between with the result that the training facilities are under-utilized for many Courses : trainees are not getting placements and employers are not getting trained manpower. PSSC will act as a mediator between all the three parties and ensure that co-ordinated efforts of all lead to skill development in the Power Industry

- Update the Curriculum which is market driven and caters to the requirement of the Industry. PSSC will standardize the curriculum for training of skilled and semi-skilled workers in order to effectively train a large number of workers. At present, majority of the engineering graduates passing out from the reputed institutes join the IT/Management sector and even those who join the Power Sector have to be given extensive specialised training before their deployment in the Power and related sectors.

➢ At present there is lack of awareness about the type of courses, trades and institutions both Government and private and also about opportunities in the field of vocational education and training. Create awareness on the opportunities available in the Power Sector through Awareness Programs in the Schools/Colleges/Road Shows to expand the reach by adopting innovative approaches to ensure equitable access to training to all irrespective of any gender, regional, social and sectoral divide. The awareness generation will be carried out through various audio visual media, skill fair and competitions at District, State and National Level; public campaign about the significance of the vocational training in enhancing the employability for decent jobs and so on.

- Ensure that the Training Partners adopt modern and scientific training methodologies and creating an infrastructure including course materials and training aids.
- Get the standards developed for assessment and certification of Trainers and as also for Affiliation of Institutes and get the same implemented through all Stakeholders in order to ensure consistency in quality. There is no appropriate testing and accreditation system hence employers find it difficult to rely on the documents produced by trainees coming up for employment.
- Interact widely with all stake holders through its members, committees and promoters' bodies ; enter into MOUs with the Industry/Employers in placement certified employees and create a salary differential for those who are skilled and certified vs. those not skilled/certified.

➢ Engage with the Industry/employers for adoption of ITI's. At the end of 11th Plan, 56 Institutes were adopted by PSUs and 12 by Private Sector and the number currently stands at 69. PSSC and employers to adopt the ITI's to ensure that the training curriculum is market driven and to enable placement of the students of the ITI s adopted by them.

- In terms of enhancing the capacity of ITI, following initiatives are required to cater to the skill needs of the industry"
    - setting up more ITIs,
    - running shorter duration but more targeted courses in these Institutes,
    - broadening the intake of apprentices,
    - improving the practical training quality
    - setting up more training institutes in addition to ITIs

➢ Endeavour to provide training to workforce in the unorganized sector in their neighborhood in the facilities available at Schools. The training shall be made available during evening/at the weekends or holidays so that employees can get the training in their spare time. The facilities available in

manufacturing units in the neighborhood will also be utilized for training for which PSSC will engage the Manufactures.

- Ensure Development of a pool of certified trainers with adequate technical competency to reach the masses
- The main role of PSSC would therefore be to ensure availability of Training Resources both in terms of Infrastructure, Training Institutes and Trainers to be available for masses, in ensuring that several mediums of skill development viz. e-learning, distance learning, learning in flexi hours and in creating awareness for the Employees and Employers on the benefits of having skilled workforce. PSSC will involve Private sector in Power Industry as a whole to work in greater coordination and come together to address these challenges and to compliment each other's efforts. The corporate houses could participate actively in industry led skill development programmes and by channelizing funds allocated for corporate social responsibility into funding and supporting the skills development initiatives by the PSSC. The role of PSSC here would be to create forums for active participation and funding by the Industry.

Activities to be carried out for achieving PSSC's objective

#	Activity	Process	Metodology : who will do it? (Organizational unit responsible and consultant identification framework, incase outsourced)
1	Skill gap/ LMI study	This will be detailed in consultation with the appointed research and implementation agency/partner in such a way that the Skill Gap analysis dovetails into the LMIS developed and maintained. Skill gap study will be carried out by an experienced research agency through interaction with the various stake holders in the industry and the data validated through extensive field surveys	Will be outsourced. The process of selecting these consultants/partners would be as follows : - Framing of the selection criteria for consultants by the sub-committee formed for the purpose by the Governing council. - Floating the RFP - Evaluation of the received bids/proposals from the vendors as per laid down selection criteria. Consultants would be selected based on their competency and prior experience.
2	Skill development plan	Based on the results of Skill gap study data, critical job roles will be prioritized for phasing for the skill development initiatives. Consultants will be appointed to develop the competency framework and skill	Will be outsourced. The process of selecting these consultants/partners would be as follows : - Framing of the selection criteria for consultants by the sub-committee formed for the purpose by the

		development plan. Skill Gap Study (SGS) will bring out: ○ Status of the sector ○ Skill requirements & gaps ○ Projections of skill requirements and gaps Current training/ education structure	Governing council. - Floating the RFP - Evaluation of the received bids/proposals from the vendors as per laid down selection criteria. Consultants would be selected based on their competency and prior experience.
3	NOS development and registration	PSSC will supervise the team of experts working on the NOS project. The team will meet the industrial units, employees, organizations to understanding prevailing and expected (as indicated by skill gap study) competency standards, and create Qualification packs and NOS, that will be validated by the NOS Subcommittee.	Will be outsourced. The process of selecting these consultants/partners would be as follows : - Framing of the selection criteria for consultants by the sub-committee formed for the purpose by the Governing council. - Floating the RFP - Evaluation of the received bids/proposals from the vendors as per laid down selection criteria. Consultants would be selected based on their competency and prior experience.
4	Assessment and certification framework development	PSSC will catalogue the job roles in the industry and competency framework for each job role, thus bringing a common understanding and uniformity in the job roles/ skill sets in the industry. It will further lay down standards to be achieved in terms of skills and deliverables for each job roles, hence the training curriculum will then need to develop and impart skill sets which will enable the learners to pass the common certification tests.	PSSC will develop the competency framework and certification criteria through their internal sources. Will be done internally by the team Will be handled internally with the help of Regional and State teams or Could be supported with the help of expert academicians, Industry Experts and Heads of Associations
5	Accreditation framework development	Build affiliation and accreditation process for institutions and examination and certification process for trainees; develop standards and assessment tools	Will be done internally by the team Will be handled internally with the help of Regional and State teams or Could be supported with the help of expert academicians, Industry Experts and Heads of Associations
6	Training of	Based on the training requirement look	- Proven expertise in training delivery

	trainers	for partners with adequate resources and infrastructure for training delivery	- Adequate number of trained and certified trainers - Availability of quality infrastructure and tools for training - Preferably a large network with standardized systems and processes in place - Ability to counsel and mobilize trainees for the sector Partners - Centum Learning, IL&FS Skills, Eduserve, IndiaCan etc
7	LMIS development and maintenance	Based on the requirement PSSC will align information received from skill gap study with national LMIS for the power sector	Will be outsourced. - Framing of the selection criteria for consultants by the sub-committee formed for the purpose by the Governing council. - Floating the RFP Evaluation of the received bids/proposals from the vendors as per laid down selection criteria. Consultants would be selected based on their competency and prior experience. • Technology enablement to create a dynamic platform for continuous updation of the data • Qualified resources • Preferably some exposure to the Power sector (though not mandatory)

3. Please indicate how the delivery mechanism for training will be created to include curriculum design, and train the trainers (please specify in a word limit of 50 words)

Delivery Mechanism

As per the specific needs of all the sub-sectors for various skill sets, curriculum design for different training modules will be developed and updated from time to time. Accordingly training will be imparted to the trainers and existing industry employees. The trainers will further train the trainees in various trades. The areas to be covered would include management, technology, industry specific knowledge, skills, soft skills, train the trainers, modules for training in industry and training institutes. Skill specific training and trainer modules, delivery mechanism including e-learning modules, infrastructure, methods of teaching, quality of trainers, course content and industry exposure would be

provided.

The delivery model for imparting skills will involve existing public or private training institutes who will be assessed for quality standards, adequacy of upgraded equipment and their ability to transition to the newly developed competency framework. The SSC will invest in developing the training content and modules to bring standardisation and uniformity in training through experts from academia, training field and industry, external training consultants who specialise in content development. The identified training institutes, in every region, will be certified as training partners and their training content will be scrutinized and certified if found suitable. The PSSC will also supervise the TOT in each of these institutes and ensure adequate trainers are trained and certified before the Institute starts their training batches. Further expansion of the Centres of Excellence model will also be taken up to provide high class, capital intensive training infrastructure in all regions of the country. In due course of time, large private players would be encouraged to build-own and operate more such high technology training institutions like it happens in other parts of the world.

4. Please provide details on how Standards and QA would be implemented (please include details of standardisation, certification and accreditation, and specify in a word limit of 50 words)

Certification & Quality Assurance

The Standards and QA for training for manpower in organized Sector in Power generation are already laid down by CEA and the same (as modified from time to time) would be followed. In respect of manpower in the unorganized sector in the power, renewable energy and power equipment manufacturing sectors, the standardization, certification and accreditation system would be devised by the PSSC through TNA studies by assessing the skill gaps and thereafter standardization, certification & accreditation process and procedures shall be got developed from the experts.

The PSSC would be the nodal body for all certifications in the Power Industry. The SSC would be responsible for developing an assessment and certification framework for all the training courses that are run across the Industry. The PSSC would be the governing body and would facilitate the assessment and certification across the country. The SSC would:

- Create the assessment & certification framework through vendors/consultants
- Establish an assessment process and schedule assessment activities across locations
- Establish a certification process and ensure certification activities across locations
- Be the repository with all assessment and certification data
- The SSC would employ a strong quality assurance process to ensure standardization & quality output.

Certification and accreditation will be the key process through which the PSSC will ensure standards and quality of training and trained manpower. Since this would need a large, specialized infrastructure to operate in all geographies of the country, this activity will be outsourced to a reputed and competent

organisation to build scalability and handle large volumes. The endeavour would be to also create this certification process on a secure, IT enabled platform to increase reach and reduce administration costs.

5. Please indicate how the Council proposes to generate finances to become self financed, and in what time frame? (Word limit of 50 words)

Financing of the SSC

The key sources of funds to be generated by the PSSC on an ongoing basis are as follows:

I. **Certification Partner Fee**: Certification partners will be charged a one-time relationship fee of Rs.**10,00,000/- (RupeesTen lakhs only).**
II. **Training Organisation Relationship Fee:** Certified Training centers will pay an annual relationship fee of Rs.10,000/- (Rupees Ten Thousand only) per annum.
III. **Certification Fee Royalty:** The pricing for certification will include an over-riding royalty as follows:

Short Term Course 2-4 Weeks	Rs.150/-	Increase of Rs. 10% in 5th & 8th year
Medium Term Course 4-6 Weeks	Rs.250/-	Increase of Rs. 10% in 5th & 8th year
Long Term Course 6-12 Weeks	Rs.350 /-	Increase of Rs. 10% in 5th & 8th year

Similarly, the re-certification fee royalty of Rs.50/- will be retained by the PSSC for certificates renewed every 5 yrs.

IV. **Trainer Certification Fee:** Each approved trainer will be certified and the PSSC will retain a fee of Rs.1,500/- (Rupees One Thousand Five Hundred only) per trainer certified with an increase of 10% in the 5th & 8th year. Similarly, the re-certification fee royalty of Rs.500/- will be retained by the PSSC for certificates renewed every 5 yrs.

With the above fee structure and the projected skill delivery plans, the PSSC is expected to become ***financially self sustainable in the 3rd year of operation***. It would be able to ***repay the complete NSDC debt along with the interest charges in the 3th year*** of operation. It would generate reasonable surpluses thereafter.

The initial development stage of the PSSC for the period of the first three years will be partly funded by a ***grant from NSDC to the extent of Rupees Five Crores only***. A subsidized loan of Rupees Fifty three lakhs only with interest and principal repayable after a moratorium period of two years. Further, the promoters would invest seed equity of Rupees One Crore. All members of the Governing Council, except Ministry of Power, Min. of Renewable Energy i.e. Govt,, NSDC and CEO, will contribute equally to muster the amount of Rs. 1 cr. The PSSC may also need to facilitate availability of soft loans for education as well as setting up/up gradation of existing training institutes through banks and NSDC respectively. Re-skilling, certification and skills up gradation of in-service candidates will also have to

be taken up after the pilot phase.

6. Plans for initial set up, activities, and scale up (it will be helpful to indicate how the plan addresses the issue of scalability; e.g. the plan addresses the issue of scalability by developing e Learning based curriculum and delivery; word limit of 50 words)

Initial Set-up and Scale-up Activities

PSSC in its first year of operation will focus on building a strong management team, communicating with the industry, signing sector level MOUs with top industry players, identification and engagement of various service partners, investments in cataloguing sector Job Roles and development of competency framework and NOS for the identified industry Job Role(s). The second year will focus on completion of NOS, skill gap study, LMIS, accreditation of Training Institutes, running the pilot including engaging first five training partners developing training content & curriculum, training of trainers & learners and assessment of the pilot, based on which a detailed scale up plan for subsequent years will be prepared. The focus in the third year will be preparation of DPR, continued work on LMIS, skill gap study & competency framework and certification of training institutes. The detailed activity sheet for the first three years is attached for reference. (annexure)

7. Technology usage & innovativeness (pl indicate how the program plans to use technology or innovative models to achieve scale/create a ripple effect in skill development; e.g. video conferencing to provide technical education in various centers of India or setup "train the trainers" facility to increase availability of trainers; word limit of 50 words)

Technology Usage and Innovativeness

With rapid mechanisation of the Power Sector, it is important that skilling of manpower focuses on the latest technologies and equipment. As the requirement of training would be very huge, the lesson plans for various training modules/lectures would be made web-based so as to provide the distance learning/training to the participants. Video conferencing facilities would be used at the various centres of excellence for interaction of the trainers/trainees with various experts to scale up the training activities. These training activities shall be carried out concurrently with distance learning. Training to trainers shall be imparted by PSSC and other accredited institutes. The PSSC will endeavour to facilitate creation of training content & curriculum that will utilise the most common tools & machinery so that learners feel comfortable working with technology through emphasis on practical training rather than theoretical inputs. Quality and standardisation of training content will be ensured through the use of training aids like educational films, video conferencing, web enabled and satellite based classes. Synergies will be worked out with the manufacturers and suppliers of equipment and machinery of the Power Sector to incorporate their technological inputs and use their technical personnel for training the trainers as well as create training infrastructures with the latest equipment/devices.

8. Outline the monitoring mechanism for successful implementation and smooth running of the project (in terms of monthly information systems (MIS), other tracking systems etc., word limit of 50 words)

Monitoring Mechanism

The initial two years of operation will involve project status reviews on a monthly basis internally and on a quarterly basis with the governing board of the PSSC. A monthly status MIS report tracking the project against milestones will also be available to all the members of the Governing Board for their reference and support. From year three, the PSSC will provide for an online score card of key impact parameters defined above to be available for NSDC and other governing stakeholders to monitor the status of progress of on-going operations.

A combination of conventional physical evaluation through written test/viva voce as well as online appraisals would be arranged for all the trainees by the respective institutes so as to assess their capabilities and effectiveness of the training programme after completion of each of the training modules/training programme. A monthly information system for the main activities, critical activities and sub activities shall be developed for close monitoring of the project.

9. Partnerships : The Applicant shall indicate the partnerships that the plan envisages for smooth running and sustainability of the program and how many of them are already in place.

a. Partnerships with employers/ industry bodies (kindly indicate the partnerships that will be needed and the partnerships that are already in place; word limit of 50 words.)
b. Partnership with financial institutions (word limit of 50 words)
c. Partnership with Training, Certifications and Accreditation Organisations (word limit of 50 words)

Partnership agreement would be made with all the major organizations including member organizations figuring in the governing council as well as the industry associations Partnership agreement would also be made with knowledge based institutes for the furtherance of the activities. Partnership agreements would also be entered into with international organizations engaged in skill development and some sector skill councils in leading countries for furtherance of skill development activities.

Employers & Industry Bodies: In order to successfully achieve the core objective of the SSC, it is imperative to partner with the right set of organizations for each of the key solution elements. These partnerships, apart from delivering specific chartered elements towards the business rollout, will provide the SSC with the relevant industry domain expertise in the Power sector. Some of the organizations with whom PSSC will have to create partnerships are as follows:

a. Organisations in other countries to collaborate in developing best practices in the area of skill development in the Power sector.
b. Training Content: Tie ups with Industry partners and pan-India employers for Content Creation and Internship (as part of the curriculum), CEA, IEEMA, Corporate Players like BHEL, ESSAR, Reliance Power etc.

c. Competency Frameworks, Standards and NOS - PWC, IRIZE, Global Peers etc.
d. Training Partners - IL&FS, CBIP, Eduserve, IndiaCan etc.
e. Assessment, Certification and Accreditation – Eduquity, TCS, Attest Aptech, Merittrac, Satvat Online etc.
f. Sector Skill Council for Energy and Power Utilities in other Countries
g. Overseas Universities specialized in RE technologies: a. Wuppertal Institute for Climate, Environment and Energy, Germany b. School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia c. Centre for Energy Efficiency and Renewable Energy (CEERE), University of Massachusetts, USA etc.

Financial Institutions: The business plan envisages seed capital and venture funding coming from financing institutions in the Power Sector viz. Power Finance Corporation and Rural Electrification Corporation setup for financing the power sector schemes. Renewable energy sector includes Indian Renewable Development Agency (IREDA) for financing the renewable energy schemes. In addition, the banks shall also be associated for giving loans to the trainees which can be recovered from their employers after placement.

Training, Certification and Accreditation Bodies: The PSSC, through its relationship with CEA, IEEMA and its members can access strategic relationships with existing education & training bodies. It will also have access to leading international bodies and their Indian JVs for the purpose of gaining expert services in the areas of content, training, certification & accreditation. Most importantly, it will have to work out constructive and inclusive relationships with the existing training, certification and accreditation bodies to improve the value and credibility of certification. The PSSC will need to identify a few accreditation partners to form working relationships as also certify quality training partners over the next 10 years in all regions of the country. PSSC will endeavor for Tie up with international SSCs for bringing global accreditation, standards & best practices & possible tie up to create consortium of employers to create industry engagement with PSSC. Partnership agreements will be entered with training certification and accredited organizations for smooth operation of Power Sector Skill Council.

Financial Plan

Please indicate the critical financial parameters of the proposal along with sufficient backups indicated below: All the supporting documents should be attached as Annexures.

a. Please provide financial statements including P&L statement, balance sheet and cash flow statement for at least previous5 (five) years of the sponsoring organisation (*please provide soft copies of the worksheets*).

Attached with the documents provided with the proposal.

b. Details of the Capital Expenditure for the next 10 (ten) years of project operations (*kindly specify in detail the list of existing and proposed equipment, technology etc. with costs and their key functions*)

Provided as part of the Financial Model attached with the Proposal.

c. Details of the Operating Expenses for the project for the next 10 (ten) years of project operations (*kindly specify in detail the list of discrete annual fixed and recurring expenses for smooth running of the project*)

Provided as part of the Financial Model attached with the Proposal.

d. Details of the Revenue model/ key sources of earning for the project (*please indicate the key revenue streams for the project; e.g. certification, accreditation, course fees, training of trainers, productivity analysis etc)*

Provided as part of the Financial Model attached with the Proposal.

e. Financial Internal rate of return (IRR) from the project including the major base assumptions in the financial model.

Provided as part of the Financial Model attached with the Proposal.

f. Type and amount of funding required from NSDC like equity investment, soft loan, etc. *(it will be helpful to give a brief rationale around why this funding should be provided by NSDC; word limit 50 words)*

Provided as part of the Financial Model attached with the Proposal.

g. Amount raised from other sources (including own contribution) (Provide list of the breakup and funds raised from other sources like industry members, associations, individual donors, banks / financial institutions, State govt., donor agencies, ; word limit 50 words*)*

Provided as part of the Financial Model attached with the Proposal.

h. Financial independence *(please indicate how the Proposal envisaged by you will become self sustainable after the first few years of funding support from NSDC; word limit of 50 words)*

Provided as part of the Financial Model attached with the Proposal

i. Key risks associated with project and mitigation strategy (*market, technical, organization and financial risks; word limit of 100 words*)

Key risks associated with project

a. Market: Reduced demand for Skilled man power may adversely affect placement of Trainees. Market slow down may affect financial support by members for training activities. Proper communication through LMIS and other means between Training Providers and employers shall enable to revise Training Programme and may to some extent mitigate effect of Market Changes.
b. Technical: Technology changes may require additional training in new technologies rendering old technologies obsolete. Additional training in new technologies shall mitigate this effect.
c. Organisation: In today's business environment acquisition and mergers are becoming common leading to restructuring of business and organizations. Organisation after restructuring may require training in different skill sets.
d. Financial Risks: Changes in Govt. Policies, taxation & market conditions etc. may adversely affect the finances of the stakeholders' organizations. Readjustment of the budgets and other measures may mitigate the effect to some extent.
e. Effective cooperation and support of the industry as well as the various statutory bodies, for the PSSC skill initiatives is very critical for the success of the venture.
f. Various Industry players present a wide canvas of companies in terms of culture, processes, perceptions, value chain & nature of organization, getting them on a common platform in terms of various PSSC activities will be a challenge for promoters.
g. Any changes in the National Vocational Qualification Framework and other related policy developments may delay or impact the validity of investments made in skills program.
h. Effective learner funding mechanism will be needed to ensure volumes of enrolments going beyond government supported programs.
i. Availability of trainers both in terms of number & effectiveness will be a big challenge for PSSC.
j. Continuous revision of NOS, Training Contents in view of changing technology & market trends will be a challenge for PSSC.

Organization details/ Profile of Management Team

Please indicate the organization details and the prior experience and the qualification of the management team identified. All the supporting documents should be attached as Annexures.

a. Details of the company/industry body/group of organisations applying for the proposal *(please indicate organization name/ country and year of incorporation/ registered office/ contact details/ key activities of the organization/ sector expertise and provide relevant legal documents as Annexures)*

b. Proposed organization structure *(Sec 25 Co; Public Limited Co; word limit of 50 words)*

c. Prior experience in skill development space *(word limit of 50 words)*

d. Educational qualification and experience of the management team, or proposed team *(team member wise; word limit of 50 words)*

e. Please provide details of key achievements of(or the key achievements you will look for in the proposed) management/ project team in the area of skill development *(word limit of 50 words)*

f. Experience of Project Execution Team or proposed Project Execution Team (please provide detailed CV of the project execution team)

a. Details of the Industry Body applying for the proposal

CEA

Central Electricity Authority (CEA) is a Statutory Body constituted under the erstwhile Electricity (Supply) Act, 1948, hereinafter replaced by the Electricity Act 2003, where similar provisions exists, the office of the CEA is an "Attached Office" of the Ministry of Power. The CEA is responsible for the technical coordination and supervision of programmes and is also entrusted with a number of statutory functions. One of the many important responsibilities of CEA is to **promote measures for advancing the skills of persons engaged in electricity industry**, pursuant to which it is leading the effort to promote the Power Sector Skill Council.

MNRE

MNRE is the nodal Ministry of Govt. of India for all matters relating to New and renewable energy with the aim to supplement the energy requirements of the country.

The main activities of MNRE are to facilitate R&D, manufacturing and deployment of new & renewable energy systems/devices, laying of standards, specifications, technology mapping and benchmarking, facilitate industry in obtaining appropriate international level quality assurance accreditation. The major non conventional sources of Renewable Energy are: Hydro-Energy (upto25 MW), Wind Energy, Solar Energy, biomass Energy, Tidal Energy, Geothermal Energy, Wave Energy, Biofuel Energy, Domestic & Industrial waste and Bagasse co-generation.

IEEMA

IEEMA is the national representative organization of manufactures of electrical and electronics equipments. IEEMA represents about 800 member organizations from public, joint and private sectors with its members having contributed to more than 95% of electrical equipment installed in Indian Power sector.

The major activities of IEEMA are dissemination of information about Govt. policy changes and static, representing view of the industry to Govt. , formulating industry standards, operation and maintenance guidelines to meet specific needs of numbers and their users industries and conducting technical activities under their various divisions, organizing international conferences, workshops, training programs and quality awareness programs. IEEMA is part of many councils and committees constituted by the govt.

IEEMA as the representative of the industry maintains a dialogue with Govt, various utilities , other users, standardization bodies, educational, R & D and testing institutions. IEEMA is the certified body as per ISO 9001:2000. Sub-sectors of manufacturing sector are manufacturing of main equipments, ancillary and allied industry, repair and maintenance of equipment, household and commercial electrical industry

b. Proposed Organisation Structure

The Power Sector Skill Council (PSSC) shall operate as an autonomous body, registered as a society under the Societies Registration Act XXI, 1860 with members from the Administrative Ministries, Statutory Technical Authority, Centre, State and Private Sector Utilities, R&D and Training Institutions and Power E**qui**pment Manufacturing Industry, It will be managed by a Governing Council consisting of members from all segments of Power Sector, Representative from related Industries/Associations. It will be managed by a Governing Board consisting of 23 members. The CEO of the PSSC will be the Ex-officio Secretary of the Governing Council. The Secretariat of the Sector Skills Council (SSC) shall be headed by the Chief Executive Officer who shall be responsible to Governing Council, as mentioned above. The CEO shall be supported by such professionals and staff as are considered necessary by the Governing Council.

c. Prior experience in skill development space

CEA has already setup the standards for mandatory training required for various skill sets for the generation, transmission, distribution etc. CEA has recognized 74 training institutes throughout the country under the Govt. and Pvt. Sector for providing such training at various levels.

MNRE is the nodal Ministry of Govt. of India for all matters relating to New and renewable energy with the aim to supplement the energy requirements of the country. The activities of MNRE in the area of skill development are running of short term and medium training courses, holding conferences, workshops, exhibitions etc.

IEEMA as the representative of the industry maintains a dialogue with government, various utilities, other users, standardization bodies, educational, R&D and testing institutions. The major activities of IEEMA in skill development are - conducting technical activities under their various divisions, organizing international conferences, workshops, training programs under the DRUM programme of USAID and Ministry of Power, and quality awareness programs. IEEMA is part of many councils and committees constituted by the govt.

d. Educational qualification and experience of the proposed management team

The CEO shall have over twenty years work experience, preferably with a background in the industry and have worked with skill development initiatives. A post graduate in the Electrical Engineering/Energy/Power Engineering/Business Management and/or allied field will certainly be an added advantage. The candidate preferably should have some exposure of training or dealing with Trainers. Excellent interpersonal skills are required for the person to deal with senior level persons from varied segments such as Industries, Academia, Associations and Govt. Agencies Knowledge of latest techniques viz. environment engineering, green energy etc. would be an added advantage. The educational qualifications in respect of other supporting team shall be prescribed by the Governing Council with the assistance of CEO.

The Directors shall have over fifteen years work experience, preferably with a background in the industry and subject matter expertise in their respective functions. However, this organisation structure is only indicative, the final organisation structure shall be decided by the Governing Council during the evolution stage and the roles and responsibilities, role profile and recruitment criterion can be detailed then.

The CEO will report to a Board, consisting of technical members from the Government, key association members, leading industry figures and shall include professional & trade association members. The Board can be chaired by the President, an industry luminary, who may be selected by members of the Industry. The memorandum of association highlights the composition of the Board. Similarly, each of the Directors (Director – Research, Director – Delivery Mechanism and Director – quality Assistance) shall be assisted by a board of 8 members comprising of reputed members of the industry and academia to discuss their findings and strategy. The individual Boards will be constituted only after the respective Directors have been appointed. This will ensure that strategic decisions are taken ably guided with a knack of predicting the future scenario of the sector.

e. Key achievements of the management/project team

Will be provided once the candidates are proposed by the CEO.

Some of the key traits of the Management Team proposed to be recruited shall include innovative thinking, high performance in achieving targets, good management skills for setting up and operationalising a structure or set up similar to that of SSC, good liaisoning and negotiation skills, competent leader, technical, financial & training soundness. International experience in training shall be preferred.

k. Experience of the Project Execution Team (detailed CVs)

Detailed CVs of the Senior Management Team involved with the project will be provided in consultation with the CEO.

Key documents attached with proposal

a. ~~Documents evidencing legal existence of entity e.g. Certificate of Incorporation / Registration etc.~~
b. ~~Full details of members/ trustees along with documentary evidence supporting the same like register of members / returns submitted with the authorities etc.~~
c. ~~Full details of the governing council members / board of directors/ management team looking after day to day affairs of your entity(s) along with documentary evidence supporting the same like register of directors / return submitted with the authorities etc.~~
d. ~~Details of registration with tax/other authorities for the purpose of exemptions, if any.~~
e. ~~Address of the registered office/ corporate / branch offices along with documentary evidence like copy of the registration certificate of the company, lease deeds, property papers etc.~~
f. ~~Provide tax and/ or other applicable statutory returns / reports filed / made with the government authorities for the last three years or since existence whichever is later along with relevant corporate progress and financial reporting documents like Balance Sheet/ Profit and Loss Account/ Statement of Expense etc~~
g. ~~Confirmation certificate in original signed by the head of the applicant entity such as Managing Director/ Chief Executive Officer/ Chairman confirming compliance with all applicable laws including but not limited to labour laws, environmental laws, tax laws, industrial laws, along with applicable supporting documents.~~
h. ~~Copies of minutes books of the meetings of the governing council / board of directors/ trustees/ shareholders/ members for the last three years or since inception whichever is later~~
i. ~~Details of all secured and unsecured loans / financial assistance availed by your entity(s) from banks / financial institutions / government institutions along with details of any mortgage, charge, hypothecation and pledge created on any property of your entity(s)~~
j. ~~Details and documents pertaining to all major contracts / agreements executed by your entity(s) imposing obligation/ liability and/ or special right on your entity(s) including and not limited to employment contracts with key employees.~~
k. ~~An Applicant shall provide details regarding pending or threatened litigation / quasi judicial proceedings, notices / orders etc. (if any) in relation to or in manner affecting the rights of your entity to any movable / immovable asset / liability along with relevant documents.~~
l. CV's of project execution team
m. Soft copies of technical and financial proposal (including excel sheets) in CD

Glossary of Abbreviations used in the Proposal

1	AE	Assistant Engineer
2	AICTE	The All India Council for Technical Education (AICTE)
3	B.E.	Bachelor of Engineering
4	B.Tech	Bachelor of Technology
5	CAGR	Compounded Annual Growth Rate
6	CBIP	Central Board of Irrigation and Power
7	CCPD	Certificate of Competency in Power Distribution
8	CEA	Central Electricity Authority
9	CEO	Chief Executive Officer
10	CIDC	Construction Industry Development Council
11	COE	Centre of Excellence
12	DHI	Deptt. Of Heavy Industries
13	DPR	Detailed Project Report
14	DRUM	Distribution Reforms, Upgrades and Management
15	EAI	Energy Alternatives India
16	HRD	Human Resource Development
17	I.T.	Information Technology
18	IEEE	The Institute of Electrical and Electronics Engineers
19	IEEMA	:Indian Electrical and Electronics Manufacturers' Association
20	IIM	Indian Institute of Management
21	IIT	Indian Institute of Technology
22	IREDA	Indian Renewable Development Agency
23	ISO	International Organization for Standardization,
24	ITCs	Industrial Training Centres
25	ITI	Industrial Training Institute
26	JE	Junior Engineer
27	KWH	Killowatt Hour
28	LMI	Labour Market Information/Intelligence
29	LMIS	Labour Market Information System

30	MDI	Management Development Institute
31	MIS	Management Information System
32	MNRE	Ministry of New and Renewable Energy
33	MOP	Ministry of Power
34	MOU	Memorandum of Understanding
35	NEEPCO	North Eastern Electric Power Corporation
36	NGO	Non Governmental Organisation
37	NHPC	National Hydroelectric Power Corporation
38	NMP	National Management Programme
39	NOS	National Occupational Standards
40	NPTI	The National Power Training Institute
41	NTP	The National training policy
42	NTPC	National Thermal Power Corporation)
43	O&M	Operations and Maintenance
44	PFC	Power Finance Corporation
45	PGP	Post Graduate Programme
46	PSSC	Power Sector Skill Council
47	QA	Quality Assurance
48	R&D	Research and Development
49	R-APDRP	Re-structured Accelerated Power Development and Reforms Programme
50	REC	Rural Electrification Corporation
51	RGGVY	Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY)
52	SEB	State Electricity Board
53	SME	Subject Matter Expert
54	SME	Small and Medium Enterprises
55	SSC	Sector Skill Council
56	T&D	Transmission and Distribution
57	TOT	Train the Trainer
58	TTT	Train of Trainer
59	VTIs	Vocational Training Institutes

LIST OF TRADES FOR SKILL DEVELOPMENT BY POWER SECTOR SKILL COUNCIL

Sl. No.	Trades	Segments		
		Power	Renewable Energy	Manufacturing
1.	Foreman	✓	✓	✓
2.	Mason	✓	✓	✓
3.	Carpenter	✓	✓	✓
4.	Plumber	✓	✓	✓
5.	Electrician	✓	✓	✓
6.	Bar Bender	✓	✓	✓
7.	Binder	✓	✓	✓
8.	Blacksmith	✓	✓	✓
9.	Welder	✓	✓	✓
10.	Heavy Machine Operator	✓	✓	✓
11.	Machine Driver	✓	✓	✓
12.	Fitter	✓	✓	✓
13.	Grinder	✓	✓	✓
14.	Radiographer	✓	✓	✓
15.	Rigger	✓	✓	✓
16.	Gas Cutter	✓	✓	✓
17.	Turner	✓	✓	✓
18.	Machinist	✓	✓	✓
19.	Wireman	✓	✓	✓
20.	Compressor Operator	✓	✓	✓
21.	High Pressure Welder	✓	✓	✓
22.	Crane Operators	✓	✓	✓
23.	Tug Operator	✓	✓	✓
24.	Cable Splicer	✓	✓	✓
25.	Compressor Plant Operator	✓	✓	✓
26.	Thermal Insulation Installer	✓	✓	✓
27.	Pipe Fitter	✓	✓	✓
28.	Safety Inspector	✓	✓	✓
29.	Steel Fixer	✓	✓	✓
30.	Fire sprinkler installer	✓	✓	✓
31.	Diesel engine mechanic	✓	✓	✓
32.	Motor vehicle mechanic	✓	✓	✓
33.	Spray painter	✓	✓	✓
34.	Power coating painter	✓	✓	✓
35.	TIG/MIG Welder (H Pressure)	✓	✓	✓
36.	AC Mechanic	✓	✓	✓
37.	Computer Hardware Mechanic	✓	✓	✓
38.	Machine Maintenance & Fitter (MMF)	✓	✓	✓
39.	Control Panel Erector	✓	✓	✓
40.	Fireman	✓	✓	✓
41.	Quality control inspector	✓	✓	✓
42.	Maintenance technician – mechanical	✓	✓	✓

43.	Maintenance technician – electrical	✓	✓	✓
44.	Digging Machine Operator	✓	✓	
45.	Generator Operator	✓	✓	
46.	Pump Operator	✓	✓	
47.	Drillers	✓	✓	
48.	Lineman	✓	✓	
49.	Dozer Operator	✓	✓	
50.	Dumper Operator	✓	✓	
51.	Excavation Operator	✓	✓	
52.	Piling	✓	✓	
53.	Rig Operators	✓	✓	
54.	Substation Attendant	✓	✓	
55.	Substation Operator	✓	✓	
56.	Technical Helper	✓	✓	
57.	Assistant Lineman	✓	✓	
58.	Drilling Machine Operator	✓	✓	
59.	Silt Analyst	✓	✓	
60.	Construction equipment operators	✓	✓	
61.	Pile Driver	✓	✓	
62.	Turner with CNC lathe	✓		✓
63.	Fitter with CNC wire cut	✓		✓
64.	Machinist with CNC milling	✓		✓
65.	Boring Machine Operator	✓		✓
66.	Hydraulic Operator	✓		✓
67.	Chief safety officer	✓		✓
68.	Line Inspector	✓		
69.	Elevator Mechanic	✓		
70.	Boiler Maker	✓		
71.	Lead Dredge Man	✓		
72.	Conveyer Operator	✓		
73.	Steam Fitter	✓		
74.	Main Plant Operator	✓		
75.	Fuel Handling Operator	✓		
76.	Fuel Handling Mechanic	✓		
77.	Boiler Maintenance Mechanic	✓		
78.	Turbine Maintenance Mechanic	✓		
79.	Glazier	✓		
80.	Wind Turbine service technician		✓	
81.	Wind turbine engineering technician		✓	
82.	Computer controlled machine test operator		✓	
83.	Solar & PV installer – roofer		✓	
84.	Solar fabrication technician		✓	
85.	Photovoltaic (PV) fabrication technician		✓	
86.	Photovoltaic (PV) testing technician		✓	
87.	Solar lab technician		✓	
88.	Solar hot water installer		✓	

89.	Solar radiant heating installer		✓	
90.	Solar thermal installer		✓	
91.	PV solar panel installer		✓	
92.	Biomass maintenance supervisor		✓	
93.	Biomass maintenance engineer		✓	
94.	Lever Man			✓
95	Sheet Metal Worker			✓
96	Fabricator			✓
97	Asbestos Worker			✓
98	Cutters			✓
99	Bronzers			✓
100	Tool & Die Maker			✓

Annexure II

List of training institutes recognised by CEA					
S. No.	Name of Institute	Region	Sector	Organization	Field
1	Technical Training & Management Development Centre, HINDALCO, Renusagar, (U.P)	Northern Region	Private Sector	HINDALCO	Thermal
2	Lineman Training Centre, Himachal Pradesh State Electricity Board, Solan (H.P.)	Northern Region	State Sector	HPSEB	T&D
3	Hydro Power Training Institute, Chamera Power Station -I, Chamba (H.P.)	Northern Region	Central Sector	NHPC Ltd.	Hydro
4	Training Centre, Uri HEP, Baramulla (J&K)	Northern Region	Central Sector	NHPC Ltd.	Hydro
5	O&M Training Centre, Salal HEP Udhampur (J&K)	Northern Region	Central Sector	NHPC Ltd.	Hydro
6	Hydro Training Centre, Tanakpur Power Station, Champawat (Uttaranchal)	Northern Region	Central Sector	NHPC Ltd.	Hydro
7	NPTI (NR), Badarpur (Delhi)	Northern Region	Central Sector	NPTI	More than one field
8	NPTI, Faridabad (Haryana)	Northern Region	Central Sector	NPTI	More than one field
9	EDC, Badarpur	Northern Region	Central Sector	NTPC Ltd.	Thermal
10	Power Management Institute (PMI), Noida (U.P.)	Northern Region	Central Sector	NTPC Ltd.	More than one field
11	EDC, Singrauli STPS, Singrauli (U.P.)	Northern Region	Central Sector	NTPC Ltd.	Thermal
12	EDC, Rihand STPS, Rihand (U.P.)	Northern Region	Central Sector	NTPC Ltd.	Thermal
13	EDC, National Capital Power Station, Dadri (U.P.)	Northern Region	Central Sector	NTPC Ltd.	Thermal
14	EDC, 400KV Ballabgarh Sub-station, Ballabgarh (Haryana)	Northern Region	Central Sector	PGCIL	T&D

15	EDC, 800/400/220 KV, Kishenpur Sub-station	Northern Region	Central Sector	PGCIL	T&D
16	Thermal Training Institute, GGSSTPS, PSEB, Ropar (Punjab)	Northern Region	State Sector	PSEB	Thermal
17	Electricity Training Institute, U.P. Power Corporation Ltd, Lucknow (U.P.)	Northern Region	State Sector	U.P.Power Corporation Ltd.	T&D
18	Thermal Training Institute, Obra Thermal Power Station	Northern Region	State Sector	UPRVUN	Thermal
19	Power Generating Training Institute, Korba TPS, Chattisgarh SEB, Korba (East) (Chhatisgarh)	Western Region	State Sector	CSEB	Thermal
20	Centre for Infrastructure Development Management(CIDM erstwhile CPSD) of YASHADA, Pune (Maharashtra)	Western Region	State Sector	Mahatransco	T&D
21	Koradi Training Centre, Koradi TPS, Mahagenco, Koradi (Maharashtra)	Western Region	State Sector	Mahagenco	Thermal
22	Generation Training Centre, MSPGCL, Nashik	Western Region	State Sector	Mahagenco	Thermal
23	Department of Training and Safety(erstwhile Training Research and Development Centre), MSEDCL, Nashik (Maharashtra)	Western Region	State Sector	Mahadiscom	T&D
24	NPTI(WR), Nagpur (Maharashtra)	Western Region	Central Sector	NPTI	More than one field
25	EDC, Korba STPS, Korba - 495 450(Chattisgarh.)	Western Region	Central Sector	NTPC Ltd.	Thermal
26	EDC, Kawas GPS, Disttt.,Surat (Gujarat)	Western Region	Central Sector	NTPC Ltd.	Thermal
27	EDC, Vindhyachal STPS, Distt.Sidhi (M.P)	Western Region	Central Sector	NTPC Ltd.	Thermal
28	EDC, 400 KV Itarsi Sub-station, Itarsi (MP)	Western Region	Central Sector	PGCIL	T&D
29	Technical Training Centre, Dahanu TPS, Reliance Energy Ltd, Thane (Maharashtra)	Western Region	Private Sector	Reliance Infrastructure Ltd.	Thermal
30	Reliance Energy Management Institute, Reliance Energy Ltd., Mumbai (Maharashtra)	Western Region	Private Sector	Reliance Infrastructure Ltd.	More than one field

31	Versova Technical Training Centre, Reliance Energy Ltd, Mumbai	Western Region	Private Sector	Reliance Infrastructure	Thermal
32	Main Training Center, Trombay Thermal Power Station ,Tata Power Company, Mumbai (Maharashtra)	Western Region	Private Sector	Tata Power	Thermal
33	Plant Training Centre, Bhira Hydro GS	Western Region	Private Sector	Tata Power	Hydro
34	Plant Training Centre at Dharvi Receiving Station, Tata Power company, Mumbai (Maharashtra)	Western Region	Private Sector	Tata Power	Thermal
35	Training Centre, Sabarmati PS, Torrent Power AEC, Ahmadabad (Gujarat)	Western Region	Private Sector	Torrent Power	Thermal
36	Dr. NTTPS Training Institute, Vijayawada TPS APGENCO, (AP)(formerly Trg insti. VTPS)	Southern Region	State Sector	APGENCO	Thermal
37	Power Engineer's Training & Research Centre, Moolamattom, Idukki,Kerala (KSEB)	Southern Region	State Sector	KSEB	Thermal
38	Thermal Power Station Training Centre, Neyveli (T.N.)	Southern Region	Central Sector	Neyveli Lignite	Thermal
39	Power System Training Institute, Bangalore (Karnataka)	Southern Region	Central Sector	NPTI	T&D
40	NPTI (SR), Neyveli (T.N.)	Southern Region	Central Sector	NPTI	More than one field
41	EDC, Ramagundam STPS, Distt.- Karim Nagar (A.P.)	Southern Region	Central Sector	NTPC Ltd.	Thermal
42	EDC, 400KV Sub-station , Hyderabad (A.P.)	Southern Region	Central Sector	PGCIL	T&D
43	Thermal Training Institute, Vallur Camp North Chennai TPS, TNEB Chennai(T.N.)	Southern Region	State Sector	TNEB	Thermal
44	Hydro Training Institute,TNEB Kuthiraikalmedu, Distt. Erode (T.N.)	Southern Region	State Sector	TNEB	Hydro
45	Transmission and Sub-station Training & Development Institute, TNEB, Distt. Madurai (T.N.)	Southern Region	State Sector	TNEB	T&D
46	O&M Training Centre, CESC Ltd., Kolkata (WB)	Eastern Region	Private Sector	CESC Ltd.	Thermal

47	Plant Training Centre, Budge Budge Generating Station (BBGS), Pujali, 24 Parganas, Kolkata (WB)	Eastern Region	Private Sector	CESC Ltd.	Thermal
48	Plant Training Centre, Titagarh Generating Station (TGS), Titagarh, 24 Parganas, Kolkata (WB)	Eastern Region	Private Sector	CESC Ltd.	Thermal
49	Plant Training Centre, Southern Generating Station (SGS), 28,Graden Reach Road, Kolkata (WB)	Eastern Region	Private Sector	CESC Ltd.	Thermal
50	DVC Training Institute at Chandrapura TPS, Distt.,Bokaro (Jharkhand)	Eastern Region	Central Sector	DVC	Thermal
51	OPTCL Power Training Centre at Chandaka, Power Grid Corporation of Orissa Ltd., Bhubaneshwar (Orissa)	Eastern Region	State Sector	OPTCL	T&D
52	NPTI (ER), Durgapur	Eastern Region	Central Sector	NPTI	More than one field
53	EDC, Farakka STPS, Distt., Murshidabad(W.B.)	Eastern Region	Central Sector	NTPC Ltd.	Thermal
54	OHPC Training Centre, Orissa	Eastern Region	State Sector	OHP	Hydro
55	Central Power Training Institute at Rourkela (Orissa)	Eastern Region	Central Sector	SAIL	Thermal
56	Power Plant Training Simulator Centre at Bakreswar Thermal Power Station,(W.B.)	Eastern Region	State Sector	WBPDCL	Thermal
57	Centre for Research & Industrial Staff Performance (CRISP), Bhopal	Western Region	Private Sector	Autonomous Society of M.P.	Hydro
58	EDC, 400/220 kV Misa Sub-station, Near Tejpur (Assam)	North Eastern Region	Central Sector	PGCIL	T&D
59	Training Centre, GMR Energy Limited, Near NMPT Guest House, Panambur, Mangalore	Southern Region	Private Sector	GMR Energy Limited	Thermal
60	Officers Training Institute, JMC Building, Kabir Marg, Bani Park, RVPN, Jaipur	Northern Region	State Sector	RVPN	T&D

61	EDC, NTPC, Raibareli, Unchahar	Northern Region	Central Sector	NTPC Ltd.	Thermal
62	JSW Energy Centre for Excellence, Post Box No. 9, Toranagallu, Distt.-Bellary, 583, 123, Karnataka.	Southern Region	Private Sector	JSWEL	Thermal
63	Jindal Institute for Power Technology, O.P.Jindal STPP, PO-Tamnar, Dist-Raigarh, (CG) - 496107	Western Region	Private Sector	JEWS	Thermal
64	Training Institute Wanakbori TPS (Gujarat)-GETRI	Western Region	State Sector	GUVNL	Thermal
65	EDC, Tanda, P.O.-Vidyutnagar, Ambedkarnagar	Northern Region	Central Sector	NTPC Ltd.	Thermal
66	Training Centre of Gujarat Energy Training & Research Institute, Wanakbori Thermal Power Station, Vadodara, Gujarat	Western Region	State Sector	GUVNL	T&D
67	EDC, Kahalgaon STPP, Bhagalpur - 813214	Eastern Region	Central Sector	NTPC Ltd.	Thermal
68	OMS Power Training Institute, Phulnakhara, Bhubaneswar - 754001	Eastern Region	Private Sector	O&M Solutions	Thermal
69	Engineering Staff College of India(ESCI), Hyderabad	Southern Region	Private Sector	ESCI	More than one field
70	Regional Training Centre, Maharashtra State Electricity Transmission Corporation Ltd at Babhaleshwar	Western Region	State Sector	Mahatransco	T&D
71	Synergem Training Institute, Nagpur	Western Region	Private Sector	Synergem	More than one field
72	Evonik Power Plant Learning Centre, A-29, Sector 16, Noida-201301	Northern Region	Private Sector	Evonik Energy Service (India) Pvt Ltd, Noida	More than one field
73	Central Power Research Institute, P.B. NO. 8066, New BEL Raod, Bangalore-560080	Southern Region	Central Sector	CPRI	More than one field
74	Central Board of Irrigation & Power	Northern Region	Private Sector	CBIP	More than one field